VOL. XXVII NEW YORK—THURSDAY, DECEMBER 12, 1912—CHICAGO No. 24

The AUTOMOBILE

One Reason Why Cars Are Stored In Winter

Style of open shed common to the average inn; a relic of the horse

Radiators Freeze In Open Sheds While Hotel Guests Are Entertained

IT is with regret that the red-blooded motorist who takes a keen delight in speeding through the frosty air of a winter evening, puts away his car until a milder climatic condition shall have again returned. Every winter brings an increase in the numbers of those who have joined the ranks of the all-year-round motorists who, either for business or pleasure, are to be found on the roads throughout the country during the time the snowstorm and icy wind have come into their own and rule supreme.

Around the large cities throughout the United States there are a large number of inns or hotels which cater to the passing automobilist. Many of these are open all winter and every year finds more who find the cold-weather trade profitable. In a great many respects these inns are similar to those which were famous in the old countries of Europe before railroad travel became common. These were open all year and the passing traveler could stop at any time and secure accommodations.

Travel on the highways is coming back. In place of the old stage coach and the mounted traveler, the automobile, speedy as the railroad and more comfortable with its luxurious inclosed winter body, is found everywhere, at any season, going from town to town. The inns and taverns along the roads connecting business centers are beginning to cater to trade of this kind, and

A—Shed behind one of the most popular inns in the vicinity of New York. Large sign in foreground pointing to this alleged garage to indicate to guests where cars should be stored while at the inn. Shed used also as chicken-coop and storehouse

B—Large stone garage in connection with one of the largest hotels just outside of New York City limits. This is one of the few garages connected with a hotel which furnishes adequate shelter and protection against cold

yet they overlook one of the most important of all points, the accommodation for the car.

In order to look into the conditions which face the automobilist who braves the cold to make either a short or long trip, a run was taken starting from New York and following along one of the main lines to Boston for a considerable distance. This is one of the most traveled routes in the East, and the inns along this line receive more patronage during the winter than can be found in most other districts. There are a number of large towns along the way which handle a large part of the accommodations for long distance touring parties for the simple reason that the accommodations at the smaller inns are not what they should be for the car, while for the parties themselves they are all that could be desired. Frequently it is not convenient to make one of the larger towns for dinner or even for the night. A conversation with the proprietor never fails to disclose his expectation of a great increase of winter trade this season, and he invariably based his observations on the fact that his patrons had told him that they intended to keep their cars going all winter.

When asked where the parties who visited the inn left their cars, the replies were various, but always interesting. One, after making wary inquiries regarding the purpose of his visitor, stated that he was just about to have a charging station for electrics installed, and that his sheds were not in very good condition at the time, although they would soon be in excellent shape, so people left the cars outside in a small parking place, but a walk around to the back disclosed a large and ornate red sign with GARAGE, spelled out in big gold letters and a hand pointing to an open barn-like structure that serves as a combination woodshed, storehouse and hen coop. It is depicted at the top of this page, along with its identifying and somewhat necessary sign. A further conversation with the proprietor who dwelt at length on the comforts and delights of his house, developed the fact that, although nine-tenths of his guests arrived by automobile, he had never thought of providing a protected spot for the car in which they arrived, regardless of the weather.

While some of the large hotels are provided with stone garages containing a stove, these are among the minority. In illustration B is shown one of the stone variety lying along one of the Boston routes. This is connected with an exceptionally large hotel and is everything to be desired in its arrangement. Contrast with this, however, the condition shown in the illustration C, where one of the largest inns along the route from New York to Albany may be partially seen. There is not even a shed in this instance. A sudden rain or snowstorm would find the cars unprotected and open to the damage which may result. Within the inn, however, the appointments are most luxurious. Nothing has been omitted in the arrangement of the furniture or decorations which would lead to the attractiveness of the surroundings. Yet the accommodations for the costly and richly upholstered cars which frequent this resort are worse than those found even at some of the smallest taverns.

On the grounds connected with another prominent inn along the Albany line may be found the sheds depicted at D. This shed, like many of the others, is a relic of the old horse days. The halter ropes are still hanging in the stalls and the feed

boxes are along the walls. "It is no doubt a protected spot in many ways, but on a cold winter night would furnish little security and no assurance against a frozen radiator.

When the proprietor of one of the large inns was asked how the guests' cars were protected against the cold, he stated that little trouble was experienced in that direction as he employed a man whose duty it was to go up and down the line of cars located in the sheds and turn over the motors. What would happen in a case of one of our latest models without a starting crank, he did not state. It is safe to say, however, that the idea of the stable boy turning over the motor with an expensive electric starter would not appeal to the average owner.

One innkeeper along the Boston route has converted a stone stable into a garage. He uses one corner for his laundry, and the heat of the stove used in this corner is sufficient to maintain a steady heat through the garage. He further declares that as far as he knows he is the only proprietor within a distance of several miles along that particular route who maintains such a garage. He has sufficient room to store several cars, and this fact alone has brought him considerable trade showing that the desires of tourists are in this direction. Indeed, the idea of heating his garage was given to him by the remarks of guests of his inn. This garage is shown on page 1203.

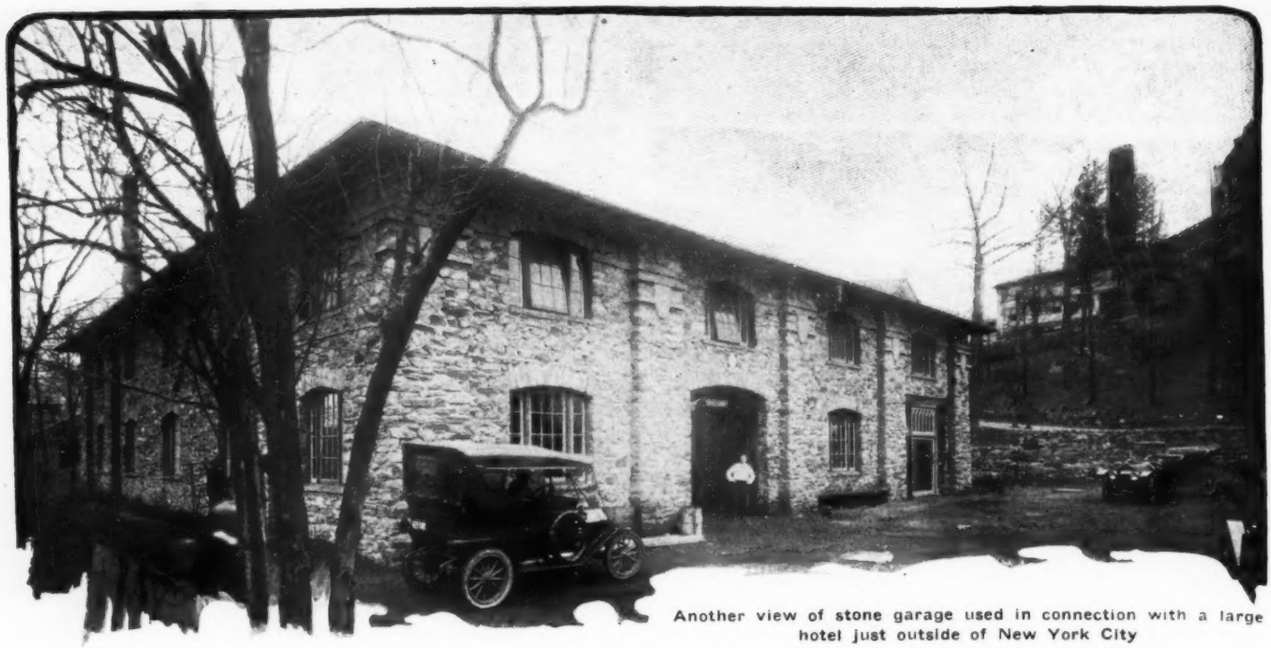
An excellent idea which has been adopted by one man who has realized the value of maintaining a heated inclosure for the cars of his guests shown at the bottom of page 1202. One portion has been separated from the rest by a thick partition. The front is inclosed by rolling doors. The track for each one of these doors runs along the entire length of the closed portion thereby enabling anyone to reach any car without disturbing or moving any other. That is to say, any portion of the front of the inclosed portion can be opened for the entrance or exit of a car. At the other end of the shed, the central portion of which is left open, is a room which serves as a stockroom for gasoline, tires and a few tools. A telephone is located in this room also, so that it would be possible in case of a breakdown to reach the town nearby by telephone, secure necessary parts and make repairs while the party waited within the hotel. This shed was formerly opened for its entire length, but is now arranged as shown and described, with very little sacrifice of space. The inclosed portion can be locked and in the summertime can be thrown open or used as a storehouse.

While at this time of the year the chances of the radiator freezing during the day are still remote, at the same time it is very difficult to start many cars while the motors are as cold as they become while standing in an exposed spot. At night the danger of freezing radiators is exceedingly great as the temperature changes which then occur are sudden and often radical. The results are so costly to the owner, who may possibly have to purchase a new set of cylinders and a new radiator, that the precautions which should be observed are justified. The device of employing a man to walk up and down in front of the line of cars in a shed turning over the motors by hand will not suffice. In fact, in very cold weather it will not even keep the water from freezing. Blankets over the radiator and hood, while very good to stave off the effects of a frigid atmosphere temporarily, are not satisfactory when the car is to be left standing for any length of time. Non-freezing solutions, while effective, are very often forgotten or are not put in because the owner perhaps had no intention of stopping when he left his home. To drain the radiator every time the car is stopped for an hour or so is too much trouble, and should be unnecessary.

A heated garage is not necessarily a great expense. It is not imperative to have the temperature much higher than

C—Showing a portion of the pretentious entrance to one of the large inns along the line between New York and Albany, which does not even provide a shelter against a sudden rain. Cars are left standing as shown, in parking space

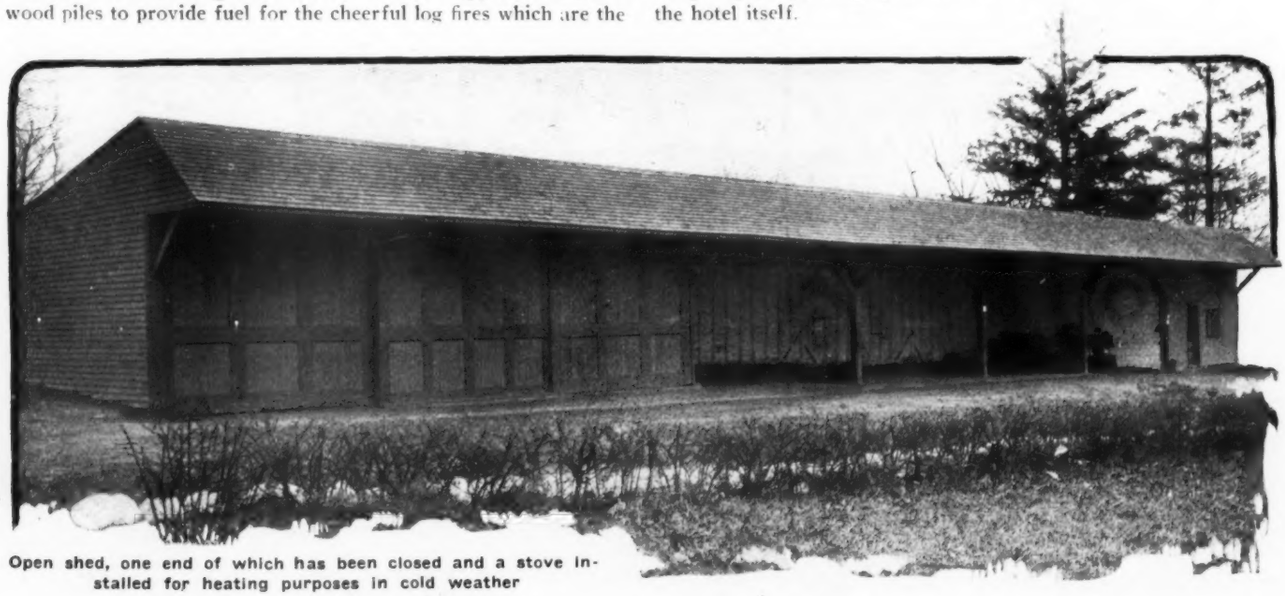
D—Squalid, tumble-down shed which is pointed out by a well-known innkeeper as a spot where guests may leave their cars in case it rains; otherwise, cars are left in a parking space on lawn. This inn stays open all winter long



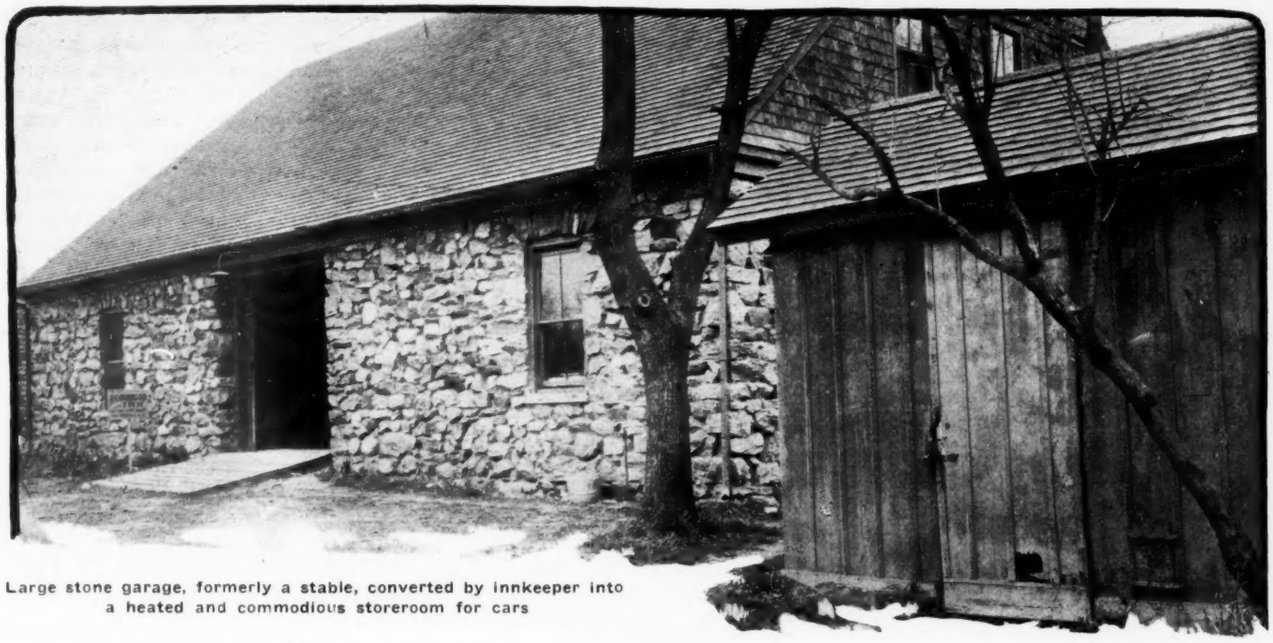
Another view of stone garage used in connection with a large hotel just outside of New York City

50 degrees. Above this temperature most cars will start easily, and there is no danger of freezing. The number of cars visiting an inn are not often great at any one time. Hence, there will be no necessity for providing extraordinarily commodious quarters for any large number of cars. A small section of the shed heated in the manner described above, by the use of a light partition would not be expensive, and would more than compensate the proprietor of the garage who arranged such a structure. Nearly all the inns which have widespread reputations have been standing since the time of the horse days or else they are the outgrowth of the bicycle roadhouse. Many of the latter type of hostelry have been very much enlarged and reconstructed throughout. All of these had sheds which accommodated horses and also a bicycle rack. There was little or no bicycle riding after the late fall season and the horse was capable of withstanding severe cold if left with a blanket thrown over him. When reconstructing the inn for the automobile and its party, the sheds were left exactly as they were. They have not grown in the majority of cases with the inn. Automobiles are parked about lawns and along the sides of the hotel approaches, while wood piles to provide fuel for the cheerful log fires which are the pride of many hostelries occupy the sheds. Many of the sheds have the ground beneath them full of glass from broken bottles or nails from boxes which have been broken up. In others, the roofs are leaking and little or no protection from a rain, while it would be utterly impossible in other cases to get a limousine beneath the roof.

Stone garages are more expensive. They have, however, the advantage of holding the heat, and can be built in such a way that the portion above the garage can be used as servants' quarters. This was done in one of the garages illustrated. As may be seen in the illustration, the upper part of the garage is shingled and provides a warm and cosy residence. This makes an ideal combination, although it is somewhat expensive to build. The heat that takes care of the servants' quarters can then be utilized to take care of the entire building, garage included. The laundry and other accessories of the hotel can be housed within such a building which could be built with a basement without any difficulty. In fact, it is possible to utilize the space afforded by such an establishment to great advantage in many ways, depending upon the size of the hotel itself.



Open shed, one end of which has been closed and a stove installed for heating purposes in cold weather

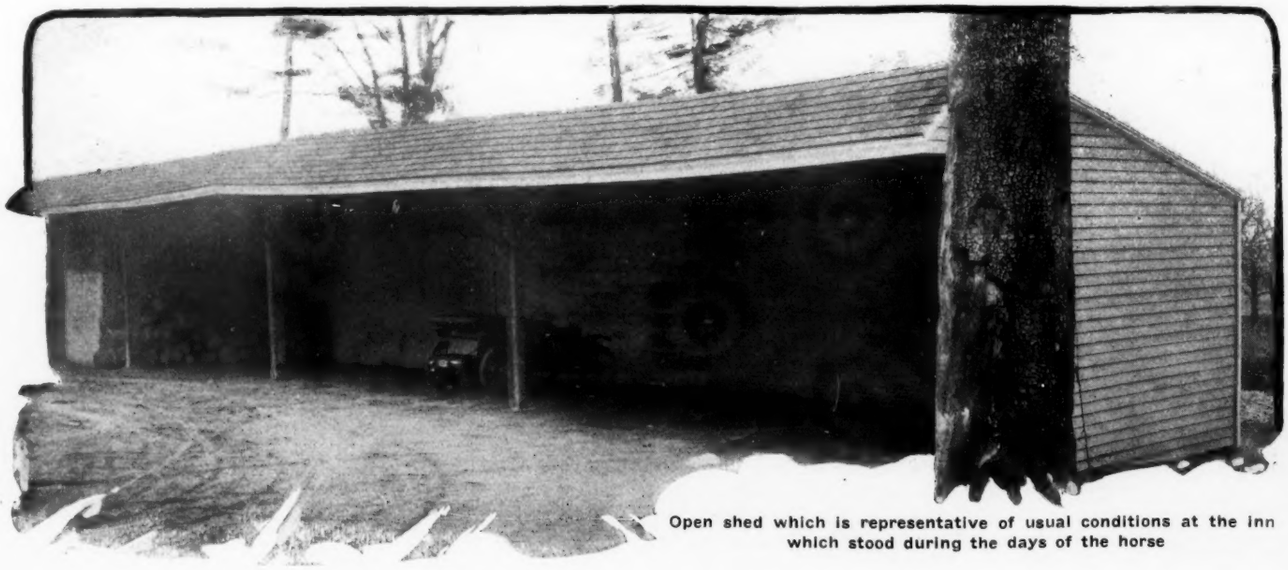


Large stone garage, formerly a stable, converted by innkeeper into a heated and commodious storeroom for cars

For the innkeeper who wishes to meet the situation as it now stands, there are many ways of protecting the car. An ingenious scheme which has been suggested is to arrange a number of portable light sockets. An electric heater is plugged into the line and placed against the radiator so as to maintain the water at such a temperature that the motor may be readily started. He may partition off a portion of his sheds or he may go to a greater expense and build a new garage designed specially to be heated. It is certain that any expense he may go to will bring him great returns if his resort is situated along the lines of main travel. It is just as important to have suitable arrangements for the conveyances of his guests as it is to provide the best of service and entertainment. There are many innkeepers who are automobilists themselves and who realize the ever-increasing number of winter tourists.

On a cold, clear winter night there are many who take a keen delight in a trip of 25 or 30 miles with a stop at some inn for refreshment. Many are deterred from stopping because they dare not leave their cars unprotected. This no doubt has a considerable influence on the number of cars which are stored, because it detracts from the pleasure of winter riding. In spite of the fact that a large number of the resorts have done absolutely nothing towards protecting the automobiles of their guests against the effects of cold, they enjoy a large patronage. This alone should show the tendency toward an increase in winter travel and it is strange that the wideawake proprietor has not more closely followed the interests of his best, and, in fact, only customers.

The automobile has ceased to be a horseless carriage, it is now at a stage where it is as much of a conveyance as the trolley or railroad. With the ever-increasing number of state roads more territory is being thrown open to it and its scope has been widened until in the more settled parts of the country it forms the ideal method of travel when the roads are not actually blocked by heavy snows or other causes. In the majority of our states the percentage of time that the roads are blocked is so small as to be negligible. Realizing this condition and also the necessity for adequate stations along the lines of main travel there is a golden opportunity for the inn to build itself up and to grow in the same manner as all year round traveling is growing. The surest way to help build up this condition is to supplement the good roads now found through every state by suitable protection and provisions for the car while it is at rest and sensitive to climatic conditions.



Open shed which is representative of usual conditions at the inn which stood during the days of the horse

Good Year for Goodyear

1912 the Greatest in History of Company Whose Factory Additions Amounted to $1,532,595

During Past Year Company Has Increased Its Capital from $6,000,000 to $15,000,000

NET income of the Goodyear Tire & Rubber Company for the year ending October 31, 1912, was $3,001,294. Other profits, chiefly on rubber contracts, amounted to $217,593 and the unappropriated surplus from previous operation is $1,856,888. The year proved to be by far the greatest in the history of the company and manufacturing operations were extended to such an extent that it was found to be advisable to increase the capitalization of the corporation. Hitherto the company has had a capitalization of $6,000,000, but during the past year this has been expanded to $15,000,000. The new stock consists of $4,000,000 of 7 per cent. cumulative preferred and $5,000,000 common. About $5,000,000 of the common stock has not been issued.

During the year dividends of $2,289,100 in common stock have been distributed and $139,604 has been paid to preferred shareholders.

The balance sheet shows assets of $13,818,214. The plant is listed at $3,855,569; actual cash on hand or deposit, $1,268,539; inventories consisting of crude rubber and other materials, $4,398,384. Patents are listed at $1 despite the fact that the company receives a large income from royalties on patents owned or controlled.

The list of liabilities include outstanding capital stock, par value $10,026,700; current debts, $1,116,406 reserves and the surplus noted above.

Additions to the plant during the year have been made at a cost of $1,532,595.

Reeves Goes to Hartford Company

Alfred Reeves, vice-president and sales manager of the United States Motor Company, and A. R. Gormully, general purchasing agent of the same corporation, have severed their connections with that company to engage in other work. Mr. Reeves has been elected vice-president and general manager of the Hartford Suspension Company, manufacturers of shock absorbers, electric starters and lighters and automobile specialties. He will remain with the motor company until after the coming shows.

Mr. Gormully has been elected treasurer of the Steinbock Engineering Company, which has been in course of development for about a year. It is announced that he will probably assume some more intimate connection with the industry in the near future.

Lion Company Confesses Bankruptcy

DETROIT, MICH., Dec. 9—A voluntary petition in bankruptcy was filed in the United States District Court here December 6 by the Lion Motor Car Company, Adrian, Mich., whose plant was destroyed by fire some time ago. C. L. Robertson, of Adrian, was named receiver by L. E. Joslyn, referee in bankruptcy, in the absence of Judge Tuttle. The concern's liabilities are given as $108,894.05 and the assets as $105,546.94, of which $86,727.91 is given as merchandise.

Receiver for Flanders Mfg. Co.

DETROIT, MICH., Dec. 7—Following a meeting of the board of directors of the Flanders Manufacturing Company December 4 at which plans for the continuing of the business were submitted by the creditors' committee, application was made on behalf of the Wagner Electric Manufacturing Company, St. Louis, Mo., by S. T. Douglass, an attorney of Detroit, before Judge Tuttle in the Federal Court in Bay City, Mich., to have a receiver appointed for the Flanders concern. The Detroit Trust Company was appointed, the bond being fixed at $50,000.

According to a statement of the Flanders company's affairs, which appeared in these columns, the concern's assets are greatly in excess of its liabilities, and its present financial distress is merely from the lack of ready capital. It is generally understood that the Pontiac plant is a money maker and that the straitened monetary condition is due to several other holdings. It is proposed to continue the business in the event that the contemplated refinancing and production plans are agreeable to the receiver.

Poss Company to Fight Bankruptcy

DETROIT, MICH., Dec. 9—As predicted in THE AUTOMOBILE last week, the Poss Motor Company has signified its intention to contest the granting of the involuntary bankruptcy petition which was filed by the Detroit Foundry Company and several other creditors in the United States District Court November 19. Denial has been made by the concern and twenty-four of its creditors that its affairs are such as to make it bankrupt. A fight in the courts is probable.

Receiver to Divide Atlas Money

INDIANAPOLIS, IND., Dec. 9—Fred C. Gardner, receiver for the Atlas Engine Works, has been authorized by the Superior Court to distribute the funds in his possession. In the final settle-

Automobile Securities Quotations

Save for a sharp bulge in Firestone, Swinehart and Miller which made new high marks for each of those stocks, the automobile securities market for the past week has been a fruitful field for the bears. The activity in those tire issues was accounted for on a variety of theories, but the main fact that stands out is that the buying was apparently by insiders. There was some talk of a merger but nothing definite developed. The buying orders appeared on Tuesday and various brokerage houses reported that quite an amount of the shares were picked up. Otherwise the market slumped badly in response to the general situation in financial circles, based upon European politics.

	1911 Bid	1911 Asked	1912 Bid	1912 Asked
Ajax-Grieb Rubber Co., com	..	..	180	190
Ajax-Grieb Rubber Co., pfd	..	..	98	99
Aluminum Castings Co., pfd	..	..	98	100
American Locomotive Co., com	34	35	41½	42½
American Locomotive Co.,, pfd	102½	102¾	106	107
Chalmers Motor Company	..	..	125	145
Consolidated Rubber Tire Co., com	5	10	11	14
Consolidated Rubber Tire Co., pfd	12	20	50	60
Firestone Tire & Rubber Co., com	178	185	310	316
Firestone Tire & Rubber Co., pfd	108	110	105	107
Garford Company, preferred	..	..	100	102
General Motors Company, com	37	38	33	34
General Motors Company, pfd	76½	78	76	77½
B. F. Goodrich Company, com	..	..	63	64
B. F. Goodrich Company, pfd	..	..	105	106
Goodyear Tire & Rubber Co., com	245	250	..	425
Goodyear Tire & Rubber Co., pfd	104	106½	105	106
Hayes Manufacturing Company	..	..	..	90
International Motor Co., com	..	..	..	18
International Motor Co., pfd	..	..	..	65
Lozier Motor Company	..	..	..	40
Miller Rubber Company	..	..	158	163
Packard Motor Company, pfd	104½	106	105	106
Peerless Motor Company	..	..	115	120
Pope Manufacturing Co., com	40	43	27	28
Pope Manufacturing Co., pfd	66	68	68	70
Reo Motor Truck Company	8	10	9	9½
Reo Motor Car Company	23	25	19½	20½
Studebaker Company, common	..	..	38½	39½
Studebaker Company, preferred	..	..	91	92½
Swinehart Tire Company	..	..	113	118
Rubber Goods Mfg. Company, pfd	100	105	105½	106½
U. S. Motor Company, com	..	..	5	10
U. S. Motor Company, 2nd pfd	..	..	30	35
U. S. Motor Company, 1st pfd	..	..	65	70
White Company, preferred	..	..	105	108
Willys-Overland Co., common	..	..	69	70
Willys-Overland Co., pfd	..	..	100	100½

ment the common and preferred stockholders will get nothing and the bond holders of a bond issue of $1,050,000 will have to look to the property, which is now owned by the Lyons-Atlas Company, for their money.

The receiver has about $84,000, of which $20,550.92 will be used in paying the receiver and his attorneys. The balance, $63,459.89, will go to the merchandise creditors. The Lyons-Atlas Company, in keeping with the terms under which it acquired the property, has paid $31,500 interest due on a bond issue of $1,050,000, $6,500 judgments against the Atlas company, paid a debt of $105,000 secured by a bond issue and has paid debts secured by pledges of Atlas accounts amounting to $48,187.04.

Myers Heads Swinehart; Plant to Grow

AKRON, O., Dec. 9—Clifford B. Myers has been appointed general manager of the Swinehart Tire & Rubber Company to take the place of W. W. Wuchter, president of the company, who has acted as general manager.

It was announced today that the Swinehart company has plans under way for a material enlargement of the Akron plant. The present factory is in a business district in the city and as it is practically impossible to buy more land there, it is probable that a new factory will be built in the suburbs.

Crude rubber rose 4 cents at the week end, being above $1.11 for up-river fine, where the level had been at $1.07 heretofore. The firmer tone which recently developed in the leading crude rubber markets was still in evidence during the past week. Smoked sheets dropped 1-2 cent and pale crêpe rose 3 1-2 cents.

Market Changes of the Week

Few features in the market developed during the last week. In the rubber market, scrap rubber showed no change. With collections light the market remains in a firm position. Importers report a steady demand for all grades of foreign scrap. Cottonseed oil trading was of a routine character Tuesday with the increase of price from Monday failing to reflect any aggressive movement by either party. Though strong on Wednesday, it dropped to $6.25 and then rose to $6.29, a loss, though, of $.07 for the week. In the metal markets, tin and lead experienced slight losses, $.01 and $.02 1-2 respectively. In the lubricant markets, linseed oil, petroleum, Pennsylvania crude, and rapeseed oil, changed in prices, linseed oil dropped $.04, petroleum rose $.05, and rapeseed oil experienced a loss of $.04. Taken altogether the week has been one of unusual lack of activity in the metal, old rubber silk and lubricant markets.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, per lb..	.08⅞	.08⅞	.08⅞	.08⅞	.08⅞	.08⅞	.....
Beams & Channels, 100 lbs....	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	27.50	27.50	27.50	27.50	27.50	27.50	.....
Copper Elec., lb.	.17 3/10	.17⅜	.17 3/10	.17 3/10	.17 3/10	.17 3/10	.....
Copper, Lake, lb..	.17½	.17½	.17½	.17½	.17½	.17½	.....
Cottonseed Oil, Dec., bbl.....	6.36	6.25	6.25	6.25	6.25	6.29	—.07
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil (Menhaden)	.33	.33	.33	.33	.33	.34	+.01
Gasoline, Auto, 200 gals. @.....	.21	.21	.21	.21	.21	.21	.....
Lard Oil, prime...	.96	.96	.96	.96	.96	.96	.....
Lead, 100 lbs.....	4.35	4.32½	4.32½	4.20	4.32½	4.32½	—.02½
Linseed Oil.....	.50	.46	.46	.46	.46	.46	—.04
Open-Hearth Steel, ton	28.00	28.00	28.00	28.00	28.00	28.00	.....
Petroleum, bbl., Kansas, crude...	.76	.76	.76	.76	.76	.76	.....
Petroleum, bbl., Pa. crude.....	1.90	1.90	1.90	1.90	1.90	1.95	+.05
Rapeseed Oil, refined	.73	.69	.69	.69	.69	.69	—.04
Silk, raw Itai....	....	....	4.35	....	4.35	....	.....
Silk, raw Japan...	....	....	3.82½	....	3.82½	....	.....
Sulphuric Acid, 60 Beaumé	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lbs.....	4.93	4.91	4.90	4.90	4.91	4.92	—.01
Tire Scrap.....	.10	.10	.10	.10	.10	.10	.....

U. S. Motors To Move

Preparations Are Being Made for the Removal of the Company to Detroit in the Near Future

This Will Place Administration Departments in Closer Proximity to Its Manufacturing Plants

FINAL preparations are being made for the removal of United States Motor headquarters from New York to Detroit. The date for the actual change is still unfixed but it is generally believed that it will be accomplished very shortly after the judicial sale has been made and reorganization finished.

During the past week a series of meetings has been held at headquarters behind closed doors and the announcement has been made that the few remaining office employees of the company will resign within a short time.

The removal of the company to Detroit places its administrative departments in closer proximity to its manufacturing plants and foreshadows renewed manufacturing activity at the quiescent factories of the company in the Detroit zone.

The affairs of the United States Motor Company await the judicial sale that has been decreed for January 8. In the meantime, manufacturing activities are at a low ebb. Save for such industrial work as is necessary to maintain the supply of parts for the repair of existing cars all the plants of the company are shut down except for the completion of the manufacturing schedules of 1912 and the continuance of the manufacturing schedules of the Maxwell Briscoe Motor Company, for 1913 and its experimental work for 1914.

The Brush and Sampson plants are idle except for the production of spare parts; the Columbia is finishing the last of its regular schedule; Stoddard-Dayton has finished its schedule. The three Maxwell plants, chief of which is at Tarrytown, N. Y., have about completed schedule. The Newcastle plant is inactive for the time being and the Providence plant is quiescent. The Thomas plant is completely shut down except the repair department.

Under order of court the issuance of $1,500,000 of receivers' certificates was authorized to commence the Maxwell manufacturing schedule for 1913, and much work has been done toward this end. So far the money used for the Maxwell program has come from other sources than the sale of the certificates.

Attorneys for the creditors state that upwards of 95 per cent. of the total claims against the company have been filed indicating an almost unanimous opinion in the minds of the creditors as to the feasibility of the reorganization plan.

The second call for 10 per cent. of the assessment levied against the stock has been made, but details as to the exact amount of stock deposited are lacking. It is said that it totals more than a majority.

No apprehension is felt among the various interested elements in New York with reference to the court action in bankruptcy in New Jersey.

It is pointed out that the New York court has possession of the assets and that the indicated program of sale will be carried out.

At the meeting of the sales and district managers of the company, those who represented districts in which the branch houses have been liquidated resigned automatically and the remainder considered the future in executive session.

Announcement has been made that C. E. Reddig, chief engineer of the Columbia Motor Car Company, and designer of the Columbia-Knight car, has resigned his position with that company, and has been made assistant chief engineer of the Timken-Detroit Axle Company, with headquarters in Detroit, Mich.

S. A. E. Program for Winter Meeting Fixed

Sessions To Last 3 Days—New Members in Board of Trade—Studebaker Branch Managers Meet

New Morgan & Wright Buildings Will Have More Than 1,000,000 Square Feet of Floor Space

DETAILS of the program to be followed at the annual meeting of the Society of Automobile Engineers are contained in the current issue of the bulletin published by that organization.

The sessions will be held at the new Hotel McAlpin and will commence January 16 at 9:30 o'clock in the morning with a business and professional meeting. There will be a professional session at 2 in the afternoon and the Commercial Vehicle will be the subject of discussion and consideration at the evening meeting.

Friday, January 15, will have professional sessions at 9.30 a. m. and 2 p. m. and in the evening the annual banquet will be held at the McAlpin. Saturday morning's professional session will close the convention.

Prior to the opening meeting the Standards Committee will assemble on Wednesday at the headquarters of the organization to receive the presentation of the reports of subdivisions that have met with the approval of the Council.

Among the papers and reports scheduled are the following: Reports: Broaches, C. W. Spicer; Ball and Roller Bearings, David Fergusson; Frames, J. G. Perrin; Miscellaneous, A. L. Riker; Sheet Metals, T. V. Buckwalter; Motor Testing, John O. Heinze; Nomenclature; Springs, Harold L. Pope; Truck Standards, William P. Kennedy; Wheel Dimensions and Fastenings for Tires, William P. Kennedy, and Aluminum and Copper Alloys, William H. Barr. All of the above are formal reports of divisions of the Standards Committee and will be presented by the various chairmen as noted.

Among the formal addresses scheduled are the following: Effect of Relation of Bore to Stroke in Automobile Engines, John Wilkinson; Stability of Automobile Propeller-Shafts, J. M. Thomas; Methods of Brake Capacity Determination, S. I. Fekte; Leaf Springs, L. J. Lane, and Standardization of Drawings, George W. Dunham.

Numerous other optional papers have been listed in case the opportunity is afforded for presentation.

Board of Trade Elects Four

Four new members have been elected by the Automobile Board of Trade and have qualified for membership in that organization. They are as follows: Federal Motor Truck Company, Inter-State, Imperial and Stutz.

The accessions bring the membership of the A. B. of T. up to sixty-three, which is a new high record for that association. The present tendency to be noted in the national organization is to absorb individual members of the National Association of Automobile Manufacturers, so that when the time arrives for the merger of the two bodies the change will not be radical as far as the members are concerned.

Studebaker Staff Holds Conference

SOUTH BEND, IND., Dec. 9—Last Saturday a special train pulled on the siding of the Studebaker Corporation plant bearing a party of Studebaker officials from the automobile division in Detroit. The group included the thirty branch managers whose annual meeting has been in progress during the week. The afternoon was devoted to conferences under the direction of General Manager Gunn. In the evening a banquet was served, after which the party embarked again on the special train for Detroit.

The party included the following, most of whom returned to Detroit: F. S. Fish, president; C. Studebaker, Jr., first vice-president; G. M. Studebaker, second vice-president; W. R. Innes, assistant treasurer; Scott Brown, secretary; J. E. Spencer, assistant secretary; J. N. Gunn, general manager; A. H. Brown, Portland; B. R. Person, Memphis; L. J. Oliver, Los Angeles; C. N. Weaver, San Francisco; N. S. Riley, Kansas City; R. L. Sutherland, Indianapolis; J. A. Graham, Minneapolis; L. A. Keller, Omaha; P. E. Hawley, Boston; O. C. Reed, Birmingham; B. T. Kingsman, Buffalo; G. W. Hanson, Atlanta; L. Markle, Chicago; C. A. Quigley, Salt Lake City; J. O. Hahn, Cleveland; C. W. Hartman, Dallas; J. C. Beck, Jr., Denver; A. K. McLuney, Detroit; W. C. Vleit, Fargo; H. R. DeGroat, Philadelphia; G. H. Phelps, New York; W. W. Beeson, Louisville; C. J. Simons, St. Louis; E. H. Habersham, Washington; G. C. Nichols, Spokane; C. H. Snoke, Sioux Falls; H. T. Myers, South Bend; F. L. Kuhns, New York Vehicle branch; R. L. Messimer, J. A. Austin, R. H. Booth, Theodore F. MacManus, H. A. Biggs, Hanson Robinson, O. S. Wilson, W. B. Brady, E. R. Carpenter, H. F. Wellington and H. E. Dalton.

M. & W. to Add Sixteen Buildings

DETROIT, MICH., Dec. 9—Permits have been issued to the Morgan & Wright Company for the erection of sixteen new factory buildings to take care of the prospective increase in output of pneumatic tires. It is stated that when these additions have been completed about 5,000 tires will be turned out per day and the working force doubled.

The new structures will vary in size from 2,000 to 121,000 square feet, the largest being 60 by 230 feet and six stories high. The new buildings will swell the total Morgan & Wright floor space to over 1,000,000 square feet and will make this plant the largest in the world, it is said. The Morgan & Wright Company is a subsidiary of the United States Tire Company.

Receiver for Whitesides Truck

INDIANAPOLIS, IND., Dec. 9—The affairs of the Whitesides Commercial Truck Company have reached the Henry County Circuit Court, where Mark Davis has been appointed receiver for the company, which has a plant at Newcastle. The plant has been closed for some time and the receiver is to wind up and dispose of the business as rapidly as possible. The receivership proceedings were brought by the stockholders who have been unable to agree as to how the business should be conducted. The company was founded by V. M. Whitesides, who was general manager until he withdrew from the concern a few weeks ago.

Massachusetts Fees Jump $140,000

BOSTON, MASS., Dec. 7—The Massachusetts State Highway Commission closed its fiscal year November 30. The gain in the number of cars shows a jump of more than 11,000, while the increase in fees represents something like $140,000.

In 1911 there were 38,907 cars registered from which the commission got $380,760, while this year 50,132 machines were put on the books for which $492,482.50 was collected. The manufacturers and dealers helped to swell the fund, too, for last year with only 870 the state got $24.849, while for 1912 the figures show a gain to 1,114 from which $27,157.50 was secured. This does not include nearly $5,000 for additional number plates for dealers.

Next in importance in revenue comes the operators' licenses that brought in this year $29,386, compared to $22,122 in 1911. The renewals of licenses was good for $16,127.50 this year against $12,672.50 last year. The chauffeurs poured in $11,140 for licenses

and $7,063.50 for renewals, while a year ago the figures were $8,366 and $5,680.50, respectively.

Then there were the examinations that were good for $14,036, while in 1911 $12,274 was received. The increase averages about 25 per cent. all along the line.

This year there were within a few hundred cars rating under 30 horsepower registered as many as there were of all classes a year ago. The cars under 20 horsepower getting the $5 rate totaled 15,774. Those between 20 and 30 getting the $10 rate numbered 22,265. Some got proportional rates between due to change of ownership.

Chauffeurs contributed $32,239.50 this year against $25,000 in 1911. And the drivers of horse-drawn vehicles numbering thousands never have to pay a cent to earn their living. The commission is now receiving applications for 1913 numbers.

Comparative figures showing the increase in registrations and finances from the motor industry in the Bay State in 1912 over that of 1911 are as follows:

	1911	1912	1911	1912
Automobiles	38,907	50,132	$380,760.00	$492,482.50
Motor cycles	3,685	5,034	7,030.00	9,640.00
Manufacturers, dealers	870	1,114	24,849.00	27,157.50
Operators' licenses	11,561	14,693	22,122.00	29,386.00
Chauffeurs' licenses	4,183	5,570	8,366.00	11,140.00
Operators' renewals	25,345	32,255	12,672.50	16,127.50
Chauffeurs' renewals	11,361	14,127	5,680.50	7,063.50
Examinations	6,137	7,018	12,274.00	14,036.00
Miscellaneous cash	...	...	3,663.95	9,200.44
Fines	...	...	26,744.50	29,108.00
Total			$504,162.45	$645,344.44

Balkan War Gets the Angora

SAVANNAH, GA., Dec. 9—The possibility that the Balkan controversy and the attending depression of Turkish commerce will result in the price of automobile tops advancing is suggested by the fact that much of the material now used in making the high class motor car top covering is of mohair, which is imported from Turkey, the home of the famous Angora goat.

With all the mammoth automobile business of the United States encouraging its manufacture, the best mohair material for their use is not made in the United States. The material is rubberized after it reaches America, and a lining added to it before it goes to the factory to go over the framework of the automobile top.

U. S. Motor Branch Dissolved

WASHINGTON, D. C., Dec. 9—The United Motor Washington Company, a branch of the United States Motor Company, has been dissolved, the Maxwell agency being given to H. B. Leary, Jr., and the Columbia to the Dupont Garage Company. Leary has leased the company's salesroom and the Dupont company has taken Leary's old quarters at 1317 Fourteenth street, N. W. The latter also handles the Rambler and Mitchell. John R. Thomas, former manager of the United Motor Washington Company, has been promoted to the managership of the Philadelphia branch.

THE FLEX-O-FILL CORE COMPANY has been incorporated under the laws of New York for $50,000 to manufacture a tire filler for which patents have been asked. The principle involved is that of applying pressure to the circumference of the core in such a way that wounds in the casing will not cause the destruction of the shoe. The substance used for the filler is designed to heal up small wounds by automatic action. The incorporators are G. Osborn, L. McCready, M. A. Noble, and the offices and factory of the company will be in New York.

THE ANNUAL BEEFSTEAK DINNER of the Big Village Motor Boosters will be held January 14, during the opening week of the national annual show. The place for holding the function has not been fixed but a meeting of the organization has been called this week to arrange that detail and other important matters with reference to the program.

World's Records Go at Brooklands Track

New Figures for the 50-Mile Distance Established by Christiaens in an Excelsior—Hemery in Lorraine

Record for 6-Hour Run Better by More Than 66 Miles by Hemery—Other Times Bettered by Margins

LONDON, Dec. 2—There has been a revival of record breaking attempts in England, with the result that many of the old figures that have been standing as world's records have been eliminated. The world's record for 50 miles was broken last week by an Excelsior car of 60 horsepower, driven by J. Christiaens. He made two attempts to cover 100 miles in the hour and but for a slight mechanical breakdown in the first attempt and tire trouble which caused him to stop prematurely on the second run there is little doubt that he would have accomplished his object, as his speed averaged for the distance he actually covered well over 100 miles an hour. In the first attempt he covered the first lap in 1 minute 56 1-5 seconds from a standing start, and the second and third laps were covered in 1 minute 36 seconds, giving an average speed of 103.76 miles per hour. In the second attempt, although he failed in covering the hundred miles, he established new figures for the world's record at 50 miles, covering that distance in 29 minutes 18.45 seconds, which gives an average speed of 102.36 miles per hour, easily beating the previous best of 97.17 miles an hour recently set up by a Vauxhall car.

In the next series of world's records, Victor Hemery, of Continental fame, and who drove the 84.8 record-breaking Benz over the flying 1-2 mile on the Brooklands track in November, 1909, at a speed of 127.9 miles an hour, thereby not only establishing the fastest speed ever attained on the Brooklands track, but also creating a world's record that has stood ever since, took the wheel of the car. On this occasion, however, he was driving a 60-horsepower Lorraine-Dietrich and succeeded in establishing world's records from 1 hour to 6 hours. He covered 518 miles 312 yards at an average speed of 86.36 miles per hour, thus easily beating the figures put up by the 30-horsepower Sunbeam car of 451 miles 445 yards at an average speed of 75.2 miles an hour. He also established new figures for all intermediate long-distance records except the standing start 50 miles, which is fully dealt with above, established by the Excelsior car, and the 300 miles which C. M. Smith put up on a 60-horsepower Thames car, averaging 85.6 miles per hour.

Having failed to establish a record in the first 50 miles, Hemery deliberately stopped at the end of 5 hours in order to make a fresh attempt for the distance in the last and sixth hour. He began in fine style, lapping the course at a speed well over 100 miles an hour, and when everything seemed smooth for new figures he experienced tire trouble. Nevertheless, despite these halts, he improved on the old 6-hours' world record by no less than 66 miles 1,627 yards.

The new figures now read: 1 hour, 97 miles 1,037 yards, against the old record of 92 miles 797 yards; 2 hours, 189 miles 1,747 yards, against 173 miles 810 yards; 3 hours, 284 miles 817 yards, against 261 miles 1,633 yards; 4 hours, 344 miles 1,344 yards, against 319 miles 242 yards; 5 hours, 422 miles 1,574 yards, against 391 miles 1,429 yards, and 6 hours, 518 miles 312 yards, against 451 miles, 445 yards.

He covered 100 miles in 1:01:27.69; 200 miles, 2:05:56.73; 400 miles, 4:34:23.87, and 500 miles in 5:48:38.87.

Decorations of New York Show Superb

White and Crystal Color Scheme To Be Feature at Garden and Mural Landscapes at Palace

Sixty-Eight Truck Manufacturers Have Already Contracted for Space at Commercial Vehicle Exhibition

DECORATION and esthetic setting for the annual automobile shows commands a position of more and more importance each year and for 1913, the management of the New York show which will be held at Madison Square Garden and Grand Central Palace has paid more attention to the matter of decorations than ever before.

White and crystal will be the color scheme at the Garden, while mural landscapes illustrating scenes significant to automobiling will be the keynote of the Palace decorations.

Preparations for the Garden division of the show require much more labor and expense than those for the Palace. For instance, something like 200 tons of steel and 1,000,000 feet of lumber are required to reconstruct the interior of the hall in anticipation of the show. Two great freight elevators must be installed to hoist exhibits above the main floor. Part of the mission of the decorative plan is to conceal the rough corners necessitated by the alterations of the building.

The crystal feature of this year's plan will be embodied in three giant chandeliers and thirty smaller ones, suspended from the dome. Around the walls many thousands of square feet of mirrors will be placed and the sculptural effects will be carried out in white. Some of the details of the plan still remain to be worked out as far as the Garden decorations are concerned but it is certain that the lattice used last year in conjunction with ornate lamp-posts to separate the exhibits will again be favored. Garlands of flowers and greenery will be intertwined along the balconies and looped in front of the pillars that support the elevated platform.

At the Palace the main floor will show scenes on Long Island, at Delaware Water Gap, in the Berkshire Hills and along the Hudson. On the mezzanine floor, western views will be displayed.

The pergola style of decorative framework will be used in connection with trellis and garlands.

The main and mezzanine floors will be used for complete cars while the accessory and motorcycle show will be in the balcony.

The decorative features of the Palace are pronounced by the management to be the finest ever used in that building.

All the preparations for the extensive alteration necessary to convert the Garden into a fitting place to hold its section of the automobile show have to be made in advance. Each girder and stanchion must be prepared and numbered so that when the word is given it can be installed. As the big hall is frequently used for other shows up to the week before the opening day, the work of getting ready for the automobile show requires work at high pressure. The preparatory work commenced several months ago and in a big loft near the building the sky, which will be used to cover the ceiling and girders of the Garden, is now being painted. The rug that was used last year has been discarded and the covering at the coming show will be of soft blue in simulation of the real sky.

As usual, the signs of the individual exhibitors will be uniform and will harmonize with the decorations.

Twenty-one different makes of motor wagons and trucks never before exhibited in New York will be displayed in the commercial car section of the New York Automobile Show during the second week, from January 20 to 25. All of these will be located in the New Grand Central Palace. This year the electric vehicles will all be grouped together in the Palace, so that a few of the early truck makers, including several real pioneers in the field, will be found in company with the newest makers in the fold.

Sixty-eight commercial car companies already have contracted for space at the Show, 5 weeks before it opens, which is four more than the actual number of exhibitors at last winter's shows in the two buildings. There will be additions no doubt that will bring the list to between seventy and seventy-five this winter.

Of the score of makes not previously exhibited, one-half are entirely new to the market, never having been exhibited before in any show. Most of the others are western products, for which their makers are seeking Eastern recognition. Some of them have been in the market for a number of years and have made good in exacting service over poor roads in the central states.

The new makes include both gasoline and electric vehicles. They embrace all sizes, from delivery wagons of 1,000 pounds capacity to 6-ton trucks. An even greater range of size will be found among the older makers, ranging from about 800 pounds to 10 tons load capacity.

While a majority of the models on view will be fitted with standard bodies suitable for the commoner lines of business, there will be a great diversity, from florists' wagons and motor ambulances to motor fire apparatus, automatic dump trucks and so forth.

Time Schedule of M. A. M. Show Meetings

Detailed schedule of the various meetings to be held during the coming show season by the Motor and Accessory Manufacturers has been announced as follows:

Tuesday, January 14 at 10 o'clock a. m.: Meeting of the executive committee at headquarters.

Tuesday, January 14 at 3 o'clock p. m.: Meeting of the board of directors at headquarters.

Wednesday, January 15, 5:30 o'clock p. m.: Tenth annual meeting at Waldorf-Astoria.

Wednesday, January 15, 8 o'clock p. m.: Fifth annual banquet at Waldorf-Astoria.

Thursday, January 16, 2:30 o'clock p. m.: Board of directors at headquarters.

Washington Dealers Split on Show

WASHINGTON, D. C., Dec. 8—Plans for the motor car show scheduled for February 5-8 are progressing satisfactorily, despite the fact that sixteen of the leading dealers have declined to take part. Chairman T. Oliver Probey claims that more than one-half the space has been sold, it being understood that a number of outside concerns will take space in order to introduce their cars here and thus pick up an agent. A portion of the hall will be devoted to an exhibit of trucks. E. A. Garlock has been elected secretary of the show committee.

The opposition dealers, who are planning a carnival or opening week Feb. 10-15, are going ahead with their arrangements. A meeting of the committee in charge of the affair, of which J. M. Stoddard is chairman, will meet this week to formulate further plans for the carnival.

Club Garage for Quaker Show

PHILADELPHIA, Dec. 7—With but few exceptions members of the Automobile Club of Philadelphia are heartily in favor of the proposition to lease the building of the organization at Twenty-third and Market streets to the Philadelphia Automobile Trade Association for the holding of the annual automobile show which opens on January 18. This practically assures the holding of the event there, in which case it will be the largest and most representative of the industry ever held under one roof

in this city, as ample accommodations will be at the disposal of the Show Committee of the Trade Association to take care of additional exhibitors, and a larger number of cars will be on view than ever were assembled before.

Pending final acceptance of the plan to use the club's garage for the show, plans are being worked out by the Trade Association to make it the best ever. These are, as yet, only in a formative state. As has been the custom, the exhibition will extend over 2 weeks. So far, no changes in the yearly routine have been announced outside of the fact that the first week will be devoted to gasoline pleasure cars, electrics and accessories, the second week being confined exclusively to commercial vehicles. Heretofore the electrics have been on view the second week, in conjunction with the trucks, owing to lack of room.

Next Saturday afternoon from 2 until 6 o'clock, the cornerstone ceremonies and formal opening of garage and clubhouse of the Automobile Club of Philadelphia will take place. Men prominent in the automobile world will be present and make addresses.

Chicago Truck Show Growing

Nine more motor truck and wagon makers have contracted for space at the National Automobile Show at Chicago during the past week. This brings the list of complete vehicle exhibitors up to sixty-nine—one more than in the New York show.

As all of the ground floor space in the Coliseum, Annex and First Regiment Armory has been allotted, it has been found necessary to set aside a large section of the second floor of the Annex for the display of the lighter types of motor wagons. This embraces all the space on the south half of the center aisle formerly devoted to motorcycles.

Among this year's exhibitors are sixteen companies that never have shown their product at Chicago. All but four of these are new makers whose machines are just coming into the market for the first time. Eighteen of the Chicago exhibitors have made no arrangements to display in New York this winter. Most of these are mid-western makers, located principally in Chicago and in other Illinois, Wisconsin, Michigan, Indiana and Ohio cities.

The week's additions to the list are as follows:

Harder Fireproof Storage Warehouse Company	Chicago, Ill.
Kentucky Wagon Manufacturing Company	Louisville, Ky.
H. J. Koehler Sporting Goods Company	New York City
The Lansden Company	Newark, N. J.
Mais Motor Truck Company	Indianapolis, Ind.
Mercury Manufacturing Company	Chicago, Ill.
Mogul Motor Truck Company	Chicago, Ill.
Stewart Motor Corporation	Buffalo, N. Y.
Ware Motor Vehicle Company	St. Paul, Minn.

The M. & P. Electric Car Company and Transit Motor Truck Company have dropped out.

Milwaukee Show Opens January 11

MILWAUKEE, WIS., Dec. 9—The fifth annual Milwaukee motor show, to be given in the Auditorium from January 11 to 17 inclusive, will be under the auspices of the Milwaukee Motor Show Association, a new corporation. Blank applications for space have just been issued. The show will open on Saturday night, January 11, at the same time that the national pleasure car show opens in New York, and will close on Friday evening, January 18.

Tri-City Show February 19-22

DAVENPORT, IA., Dec. 9—At a meeting of the Tri-city Auto Dealers' Association held at the New Kimball in Davenport last week the date for the annual show was set as February 19, 20, 21 and 22 at the Coliseum. The annual meeting of the association was held at the same time and officers elected as follows: President, G. F. Burmeister, Davenport; vice-president, Emil Buck, Davenport; secretary, Webb Mason, Davenport; directors, G. F. Burmeister, Emil Buck and Webb Mason, Davenport; W. C. Totten, Rock Island, and Fred R. Young, Moline.

Paris Salon Opens With 565 Exhibitors

Clean Sweep for Long Stroke Motor—Six Types with Sleeve and Slide Valves Shown

After Lapse of 2 Years Tremendous Enthusiasm Manifested —Twelve American Makes on View

PARIS, Dec. 9—*Special Cable*—President Fallieres gave the signal for opening the automobile salon Saturday morning at 9 o'clock and since then the French public, reinforced by delegations from all the countries of the world in which automobiles are made, thronged the Grand Palais.

The show is pronounced the greatest and finest ever held and the expressed opinion of many of the visitors coincides with the French opinion on the subject.

There are 565 exhibitors and of these there are over 200 displays of French automobiles. England is represented by thirty-four makes, America by twelve, Germany by nine, Italy by eight, Belgium by nine, and Switzerland by four. In all there are over 275 different makes of automobiles on display.

The Grand Palais floor measures 260,000 square feet and it is all occupied by the automobile exhibition.

After a lapse of 2 years since the last automobile show was held in Paris, the enthusiasm is very great. In fact, it has been stimulated to such an extent that the holding of a show annually is practically assured.

Various propositions have been made to hold a pleasure car show every other year with a commercial vehicle exhibition on the alternate years. This plan has been viewed with favor by the parent organization behind the shows, but the immense favor with which the salon has been received makes it almost certain that a yearly pleasure car show will result, the popular demand for it appearing to be strong.

The overflow show includes displays by more than 200 manufacturers who were unable to crowd into the Grand Palais. The overflow show is housed in the Jardin de Paris, a huge pleasure garden that is usually closed at this season of the year.

PARIS, Dec. 10—(*Special Cable*)—Paris sprung a surprise on Olympia by making a clean sweep for the long stroke motor. Not counting the American exhibits there were 321 four-cylinder models, twenty-six sixes, eleven twin and fifteen one-lunger models. The motor with the smallest bore had cylinder dimensions of 50 by 100 millimeters (1.97 by 3.94 inches). The motor with the longest stroke had cylinder dimensions of 110 by 200 millimeters (4.42 by 7.88 inches). An idea of the relative sizes of the motors may be gained from the following: There were seven motors of 60 millimeters bore, forty of 65 millimeters, thirty-one of 70 millimeters, sixty-two of 75 millimeters, seventy-two of 80 millimeters, eighteen of 85 millimeters, fifty of 90 millimeters, seven of 95 millimeters, thirty-eight of 100 millimeters and thirty-seven between 100 and 140 millimeters. Thirty-three motors have a stroke-bore ratio of 2 to 1 and 50 per cent. have 1.5 to 1 stroke-bore ratio. The balance are scattered but none were square, bore equalling stroke with the exception of the Knight sleeve motors.

Six types of sleeve and slide valve motors were exhibited at the show, the Knight proving the most popular and attractive to makers. The small, well-made poppet valve is proving itself silent, economical of fuel and generally efficient. A noticeable feature was the effect of the war scare on purchasing, a great retarding influence being exerted.

Carburetted Alcohol, Harmless, Rich in Calorics and Stronger than Gasoline, Developed at French Chemical Plant and Tried Out in Ordinary Motors—Wobble-Disk Crankshaft-Drive in Aviation Motor—Convenient Hoist for Factory Use

CHECKING Rise of Gasoline Prices by Manufacture of Competing Fuels, Especially Carburetted Alcohol—The strong efforts made in Europe to emancipate the employment of all internal-combustion motors—from the Diesel ship motor and stationary power plant to the diminutive bicycle motor—from their dependence upon imported and especially American fuels, are taking more and more definite forms and promise eventually to relieve the American supply of the European demand, thereby removing one reason for the constantly increasing market prices and creating means by which a direct competition with gasoline and kerosene may be promoted even in the American home market. The fact that the Diesel motor has already been made independent, with the result of forcing the German-American oil syndicate to moderate the prices of crude oils, has greatly encouraged this movement for nationalizing the fuel supply by technical means, and it is expected that sharp import duties will be resorted to in some of the European countries to help out the national product, as soon as this may be done without hardship to the consumers.

In Germany, where the original movement for utilizing alcohol and carburetted alcohol was at one time very strong and has left sad memories of technical and financial disappointment, so far as the use of these fuels in automobile motors is concerned, the leaders of the movement have turned to benzol, and the manufacture of this distillate of coal has been so organized that a minimum output of 27 million liters annually has been guaranteed the consumer. In England, where import duties play no part, the efforts are centered upon the development of carbureters and motors in which kerosene, benzol and gasoline may be used optionally.

From France a new method for the carburetion of alcohol is announced which will also begin to interest the United States as soon as the expansion of all motoring interests shall have influenced public opinion sufficiently to warrant the removal of governmental interference with the free production of alcohol whether pure ethyl or denatured. The restrictions imposed by the Internal Revenue laws and the supplementary enactments relating to industrial alcohol and the public supervision of the denaturing processes, by which after all a substance is produced which cannot be utilized economically in any motors of ordinary construction, operate at present as a brake upon all initiative by which the cost of production of alcohol, and of any suitable fuel of which it might form a part, could be reduced to its minimum. Similar factors, it is noticed, are at work in European countries, and the condition for progress is therefore the actual production of an alcohol fuel which can compete on its merits and which the public will demand.

THE NEW PROMISE OF CHEAP ALCOHOL FROM CORN

Maurice de Keghel, a prominent chemist and manager of the French Wood Impregnation Company sets forth some interesting details on this subject of producing a really suitable motor fuel from alcohol, and the substance of his article is presented in the following with a few abbreviations at technical points.

The industrial production of alcohol has entered upon an entirely new phase since Stewart's discovery with regard to the use and harvest of Indian corn. The Stewart process is simple. It consists in detaching the ear from the stalk as soon as the grain is milky. This results in an indefinite prolongation of the life of the plant and a constant and gradual increase of the sugar-content of the stalk until it rivals that of the sugar cane. The milky ear itself contains more than 20 per cent. of fermentable matter, and one-half of the weight thereof can be turned into alcohol while the rest forms a nutritious bran mash for cattle. It is highly important that Indian corn can be raised to this degree of maturity even in far-northern countries.

According to Dupont, in *Revue Mensuelle* for June, 1912, corn harvested according to the Stewart method yields 2000 liters of alcohol per hectare of land (about 203 gallons per acre) and in addition 13000 kilograms of sugar which may be used as such or converted into alcohol.

The possibility of cheap production of alcohol may, from these data, be considered as established, but alcohol in itself is a feeble fuel and also attacks the metal of a motor. It has been shown that ordinary alcohol, or alcohol denatured with wood alcohol, cannot compete with gasoline or benzol. It must be enriched, and then two questions arise. First, with what other fuels must it compete and, secondly, how shall it be enriched in order to become most valuable and economical?

SHORTCOMINGS OF DIFFERENT FUELS AND MIXTURES

With regard to gasoline it must always be a drawback to its universal use that only about 6 per cent. of crude petroleum can be converted into this fuel and that American petroleum is the only kind which produces the best grade; the supply falls short of the demand, and the high price is aggravated by import duties. In case of war the supply is threatened. It can neither be the standard fuel in the long run nor the substance with which alcohol should be enriched.

Benzol, which is spirit of coal tar, can never supply the market as the production of it is limited by nature to a quantity incomparably smaller than that of gasoline. It is also objectionable by entraining corrosive elements in the distillation process, which it is costly to remove, by having a very high freezing point and by the strong odor of its exhaust gases.

By mixing benzol and alcohol in equal parts, as has been done in order to enrich the alcohol, a fuel is obtained in which the disadvantages in other respects of both constituents are preserved. This mixture is therefore little used.

THE TECHNICAL REQUIREMENTS

In seeking for a new kind of carburetted alcohol it has been the object to produce a homogeneous fluid with physical and chemical characteristics of its own and, of course, having none of the objectionable features of other fuels or compounds. The fuel which has resulted from these efforts contains 70 per cent. of alcohol in which elements have been absorbed from coal tar, from wood tar, from white spirit, from crude Galician petroleum

and from pyridine. The preparation involves the five processes of mixing, distillation, neutralisation, redistillation and carburetion.

DESCRIPTION OF THE NEW PROCESS

The first process consists in mixing 60 parts of 93 deg. alcohol, 23 parts of wood tar and 17 parts of coal tar and heating the mixture, which is thoroughly stirred, slowly to 90 deg. C. in a still. The distillate is gathered by condensation in a cooling coil. It gives a plainly alkaline reaction and emits an odor resembling at once that of creosote and that of benzol, and this odor remains with the product throughout the subsequent processes. The distillation yields from 65 to 67 per cent. of the total weight of the mixture from which it is made and grades 90 deg.

The residue of this distillation has a special value for the preservation of wood and cordage. The tars in it have acquired new properties in the process, the corrosive and the hygroscopic elements disappearing. By adding pitch and white spirit turpentine in suitable proportions this residue forms an excellent and very adhesive black coating for metals. On the other hand the residue may be used for the manufacture of colors, as if the tars had undergone no change.

The distillate has a greenish yellow color and holds in solution a considerable proportion of ammoniacal compounds to which its alkaline character is due. The next process consists in transforming these compounds by chemical means into salts which are insoluble in alcohol and which also have an independent commercial value. Phosphoric acid has been found the best means to this end. It causes the formation of a very stable phosphate of ammonia which is precipitated in snow-like crystals. This is removed by decantation (pouring the liquid slowly away from the precipitate) and filtration and amounts to 0.6 to 0.7 per cent. of the neutralized mass. The liquid is slightly acid after this process, however, because phosphoric acid had to be used in slight excess over the alkalinity which it was to remedy, and it is therefore now redistilled, this process resulting in a strictly neutral alcohol of 93 deg. and of a density close to 826. When cooled to minus 25 deg. C. it does not separate in the least but remains homogeneous. Its denaturing elements constitute 3 per cent. of its weight, and it is found absolutely impossible to remove them or the odor which they cause. Its appearance is greenish yellow and fluorescent. Any fraudulent use of it would be very easy to detect by reason of the presence of compounds, such as rosaniline and pyridic bases, which give constant and characteristic reactions under test.

It is this alcohol which serves for the preparation of the carburetted alcohol. Extensive experiments were conducted at the shops of Henri Mers to determine the best proportion for admixture of enriching hydrocarbons, and 35 per cent. was found to give the best average results. The carburetting process consists in the distillation of the prepared alcohol in the presence of hydrocarbon compounds which part with some of their volatile constituents and in which some of these volatile constituents during the condensation form a stable chemical combination with the prepared alcohol, so that the final product is completely homogeneous and has a fixed distillation point. And it was found that compliance with this requirement, as expected, also resulted in a fuel of extraordinary power-producing properties, when used like gasoline in ordinary motors.

CARBURETTING THE PREPARED ALCOHOL

In the actual process, 66 parts of the prepared alcohol is mixed in a large closed vat, provided with a stirring tool, with 19 parts of Galician crude oil, 13 parts of white spirit and 2 parts of pyridine. The stirred mixture is left alone for 30 hours and is then distilled at 77 to 81 deg. C., yielding at this heat an average of 86 to 88 per cent. of the total mixture. This distillate grades at 95 deg. on the alcoholometer and is the carburetted alcohol ready for use in motors.

The assimilation of the crude oil is particularly favored by the presence of the pyridine which is a remarkably energetic solvent and a veritable extracting agent in separating the hydrocarbon elements from the crude oil. By its use, 39 to 40 per cent. of the crude oil is absorbed.

The residue represents usually 12 to 13 per cent. of the mixture. It has peculiar properties. Unlike the crude oil from which it is mostly derived, it cannot be coked. While the naphtaline has been removed from it, it is easily solidified and should make an excellent briquetted fuel, especially for marine purposes. The odor of the crude oil has partially disappeared from it.

The carburetted alcohol has a density of 826 at 15 deg. C., a fluorescent greenish-yellow appearance and an odor calling to mind both creosote and gasoline. A few drops of it rile water. It is strictly neutral and therefore harmless to the metals of the carbureter and the motor. The weight of the coke from it does not exceed 23/10,000 parts of 1 per cent. The average solid residue is .0003. This explains why it does not foul a motor. Its inflammability begins at minus 7 deg. C. and it is practically unfreezable, a temperature of minus 25 deg. C. causing no change in its action. It contains an average of 8030 calories and the exhaust from it is neither odorous nor smoky. Its efficiency as a source of power in automobile or stationary motors of standard design exceeds that of gasoline or benzol by about 60 to 70 per cent., according to the tests made at the Henri Mers shops.

COST OF PRODUCTION OF THE NEW FUEL

With a cost of production for 95 deg. alcohol of 30 francs per hectoliter, which is more than the actual cost at this moment though far from the exchange quotation, and with by-products which more than pay for all the cost of preparation and distillation, the cost of production of the carburetted alcohol may be figured as 27.30 francs per hectoliter, basing the calculation on a daily production of 65 to 70 hectoliters. [This cost which equals about 22 cents per gallon would perhaps be sufficiently low to establish the product on a competitive basis in Europe, considering the claimed power-efficiency of 60 to 70 per cent. in excess of that of gasoline, and would begin to interest America in a practical manner if the cost of production of the alcohol base were reduced to 10 cents per gallon, allowing in that case for a hundred per cent. of expense in handling the product commercially.—Ed.]—From *Revue de Chemie Industrielle*, November.

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NEW Motor Types—At the recent aviation show in Paris several motors were exhibited which, though intended mainly for aviation purposes, embody new design features which are applicable to motors in general. Among these, several Canton-Unné motors made by the Emile Salmson firm attracted wide attention, partly by reason of their special design and select workmanship and partly because it was known that they operate satisfactorily in practice. One was a 7-cylinder water-cooled star-shaped motor of 80 horsepower with exposed central crank-chamber; anothed a 9-cylinder fan-style motor of 300 horsepower weighing 450 kilograms, also water-cooled; still another a 9-cylinder motor with horizontal cylinders and the vertical motor shaft connected by a reducing gear inside of the crank-chamber with a horizontal propeller shaft. But these types had been before the public for some time, while the fourth type shown was quite new and remarkable by its compactness and the adoption of a certain system for transforming the reciprocating motions of the pistons into rotary motion of the crankshaft which was brought out many years ago in an American patent for a hydraulic transmission and is at present copied and perfected in a hydraulic transmission known as the Williams-Janney and made by the Delaunay-Belleville company of France. The principle of the motion is public property. The Salmson motor in which this principle is utilized has 7 horizontal and parallel cylinders arranged as the cartridge chambers in the barrel of a revolver. Each of the cylinders has a central combustion chamber and two pistons which are moved by each explosion in opposite directions. At the ends of the cylinders

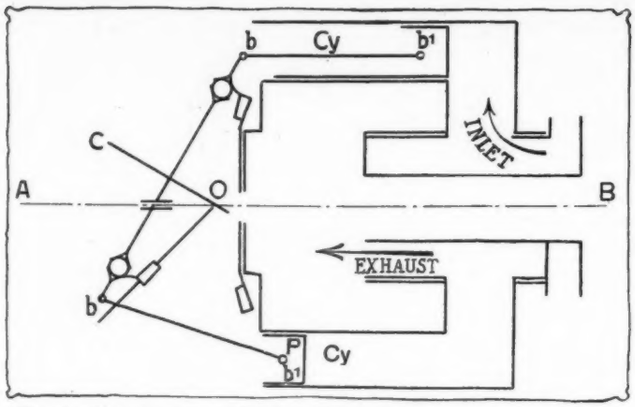

Fig. 1—Diagram of mechanical movement in one type of Canton-Unné motor

there are aluminum housings, and within each of these a round plate is secured obliquely upon the crankshaft which extends axially through the middle of the system. The connecting-rods are secured to these plates by means of a ball-bearing ring and suitable joints, so that the oblique disks are free to rotate, taking the crankshaft with them, while the cylinders remain stationary. The movement of one of the disks is diagrammatically represented in Fig. 1, showing two of the seven parallel cylinders, one at the beginning of the exhaust stroke and the other at the beginning of the power stroke. When the connecting rod b-b_1 of one of the pistons P is driven out against the circumferential ring of the disk, the latter can give room for the pistons only by rotating into the position in which its edge is farthest removed from the cylinder, and as the axis of the disk, CO, is at an angle with the crank shaft smaller than 45 degrees and the resistance to rotation is only that of friction with the ball-bearing ring—besides the load of the motor—the rotation is accomplished on the principle of following the lines of smallest resistance, practically in the same manner as a reversible worm drive is made possible by absorbing end-thrust in the ball-bearings of the worm. And a new impulsion to rotation is received as the rotating disk passes each successive cylinder of the seven, the charge being fired in each of them at that moment. Obversely, the rotation of the disk serves similarly to compress the charge in each cylinder while the disk is moving from the relative position to the cylinder indicated in the lower part of the diagram into the position shown in the upper part. The efficiency of the movement has been shown to be good when the frictions are minimized by the use of ball-bearings and by good lubrication.

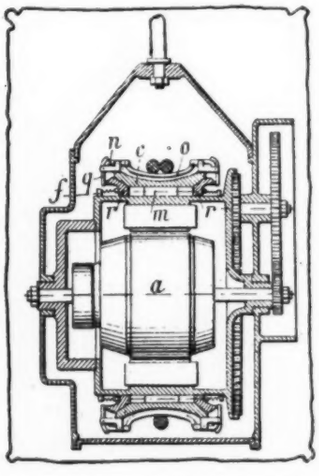

Fig. 2—Electric winch adapted for factory use

This motor develops 60 horsepower and weighs 110 kilograms. The bore and the stroke of each piston both measure 65 millimeters (2 3-5 inches), the construction naturally tending toward a short stroke in order to have the obliquity of the disks as small as possible for a given diameter of the whole system of cylinders. The valve control is arranged in the space separating the cylinders from the shaft. The water-cooling is operated by a centrifugal pump, the brass water jacket being secured upon the single casting in which the cylinders are bored. The front disk-casing contains a reducing gear; the rear one carries the magneto and incloses the force feed oil and the water pumps.—From *Allgemeine Automobil-Zeitung* of November 8 and *La Vie Automobile* of November 23.

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ELECTRIC Winch.—The Wilhelmi electric winch is notable for its compactness and is suitable for use in connection with overhead cables for the transportation of material in factories which are electrically powered. It comprises essentially a small electric motor on the shaft of whose armature (*a* in Fig. 2) there is keyed a pinion which is in mesh with a gear mounted upon an intermediate shaft which is journaled in a bearing in the frame of the device. This intermediate shaft carries a second small pinion meshing with an internal gear wheel which is rigidly fixed upon the frame of the magnetic field, which arrangement renders it possible to offset the rotary speed of the armature by that of the field, so that the reduction effected by the gears need not be so large. The drum of the winch is a cast cylinder *c* mounted to revolve upon the rollers *m* which in turn roll freely upon the smoothly turned circumference of the field frame, and the drum can be locked to this frame by means of two cones *r* which are mounted upon the latter. The cones *r* are movable transversely, being held disengaged from the corresponding conical surfaces of the drum by the springs *f* but can be brought into engagement with the drum by means of the bell levers *g* whose upper arms are formed as cams and can be actuated by two small bell levers *n*, which are connected pairwise by flexible cross members *o*. As soon as a pull is applied to the free end of the cable which makes a turn and a half around the drum, and provided a load is attached to the other end of the cable, these cross-members *o* are depressed and, thereby being made to pull on levers *n*, cause the cones *r* to be engaged with the drum, so that the latter is revolved together with the cable in the direction which means the raising of the load. In order to stop the load it is sufficient to cease pulling at the free end of the cable or cord, as this has the effect of reducing the pressure upon the cross-members *o* and of permitting the springs *f* to separate the levers *g* and partly releasing the cone clutch. The movement of the winch also in itself tends constantly to cause a slack at the free end of the cable or cord.

The operation of this winch is thus absolutely similar to that used in pulling a cord over a simple pulley, except in so far as the effort is concerned; to pull the load up, one pulls upon the cord, and to stop it one ceases to pull. A complete release of the cord causes a more complete disengagement of the cones *r*, and the load in that case draws the drum backward without causing the cord to slip on it.

The electric motor of this winch turns at a constant speed without interruption so long as the work with it is going on.—From *Zeitschrift des Vereines Deutscher Ingenieure*, October 5.

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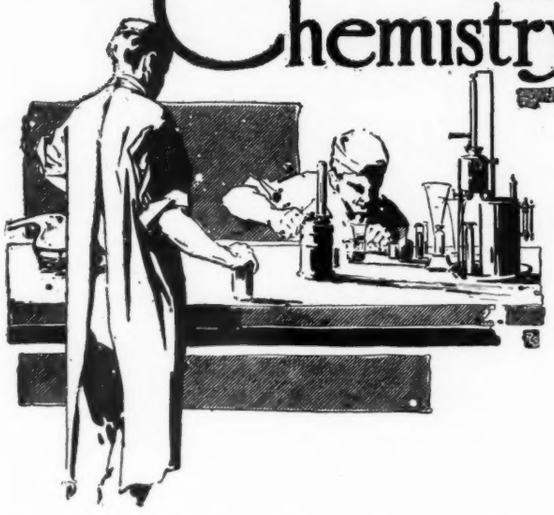
SQUARE Long-Stroke Motors.—According to Mr. Faroux, an opinion is "common among the Philistines" to the effect that it is the proportion between the bore and the stroke which makes a motor a long-stroke motor or a short-stroke motor. But in reality the length of the piston stroke is an absolute value, since on its measurement in inches depends the piston speed at any given number of revolutions. Up to a stroke length of 150 millimeters (6 inches) one cannot, with the present data of construction, speak of a long stroke. A motor with 70 millimeters bore and 120 millimeters stroke cannot be termed a long-stroke motor, despite the proportion of 1.7 between the stroke and the bore. And, on the other hand, a motor with bore and stroke both 160 millimeters is a long-stroke motor although it is commonly designated as "square." The proportion between bore and stroke is a matter of small interest, apart from statistics.—From *L'Auto*, November 10.

The Chemistry of Cylinder Oils



Professor Gallup Takes Issue with W. Jones Regarding Flash Point, Fire Point and Viscosity of Oils

WORCESTER, Mass.—Editor THE AUTOMOBILE:—The writer has noted with unusual interest the recent articles in THE AUTOMOBILE on the Chemistry of Cylinder Oils, by W. Jones, and inasmuch as the conclusions to be drawn from the statements made are so entirely at variance with not only common sense, but accepted practice, that some objection seems necessary.

The statements which deserve criticism are too numerous to mention in detail, since the space required would demand another article, but in general they may be referred to as:

1. Effect of flash point on the lubrictaing value of an oil.
2. Effect of fire point on the lubricating value of an oil.
3. Effect of viscosity point on the lubricating value of an oil.

Taking up 1: The chief argument in the article referred to seems to be that **in order to be effective, an oil should be of low flash and fire test, and for the specific reason that it burns up clean.** Might it be asked right here, what is the object of a lubricant? To lubricate or to furnish heat in the engine? If the latter be the case, why not dispense with the gasoline and use oil entirely? Or why not go still lower in flash and arrive at a point where combustion of the oil will be absolutely clean? **This would result in a clean engine and less gasoline would be used, since part of the power would be furnished by the oil itself.** But this is ridiculous. The best oil for lubrication is one which serves that purpose exclusively, one which will withstand the high speeds, high pressures and high temperatures without deterioration. At present there is no oil known which will satisfy the last condition perfectly, and the only alternative is to use that which approaches its accomplishment most nearly. Needless to say, the output of these oils is already controlled so that the distribution of a new oil requires a ready argument for its adoption, and the easiest one seems to be that it burns up quickly. Another feature of the low flash oil is that its price is usually lower than that of the high grade, and many users are appealed to on the ground that the expense for lubrication will be less. In answer to this, let it be pointed out that **an oil which is readily burned up requires excessive amounts to offset the loss due to the burning, so that at the end of a year it will be found that so much more of this low-price oil has been used than of the high-price best quality that the total cost is actually greater.** Also, consider the condition of the engine, something which is often lost sight of for the reason that an outward glance at it does not indicate the wear caused by a poor oil. It is a fact so well known as to be incontrovertible, and which has been proven in comparative tests, that the most efficient oiling is accomplished by the use of the highest flash test lubricant and in the smallest quantities possible, not by flooding the engine with a low test oil, the excess of which is burned up and which must be furnished to offset the low quality.

How long would the engine of a racing car stand up under the use of a low flash oil? The temperature existing in the cylinders under these conditions is so high that the use of an oil of low flash would amount to almost a negligible value, since the oil would be disintegrated before it had the chance to perform its function.

One more point: **The combustion of any oil is unclean;** the more unclean the larger the quantity, and hence the aim should be to use an oil which has the least tendency to burn, i.e., high flash.

Taking up the fire point, let it be remarked that this is of no value in the selection of an oil, since the lubricating qualities are determined by the flash point. This is true simply for the reason that the oil begins to disintegrate at the flash point and much of the lubricating value is lost in vaporization.

Under 3: **Viscosity is of prime importance,** if correctly determined, for the reason that it indicates whether an oil will be able to maintain a film at high temperatures or not. The usual standard of 70 degrees Fahrenheit is known to be misleading for the reason that many oils will show a high viscosity when tested at this temperature, but at higher temperatures, such as 212 degrees Fahrenheit, will show a marked decrease in this quality. This is more pronounced in the case of low flash test oils than high. Continued tests at still higher temperatures will show the divergence to be still more clearly defined. In other words, an oil showing a relatively high viscosity at low temperatures may be totally unfit for gas engine lubrication on account of the sudden loss in viscosity with increase of temperature. If, however, the test for viscosity is made at 212 degrees Fahrenheit, or at 250 degrees Fahrenheit, then the law becomes applicable and a high viscosity oil at this temperature should be given the selection. Investigating still further, it will be noted that these oils will have the higher flash tests. Put in another way, **an oil with a low flash test must possess a low viscosity at this temperature and therefore be unfit for lubrication even though at low temperature it possesses a high value of viscosity.**

On any modern engine of representative type and which is available, let a test be run for maximum horsepower, using a grade of oil outlined as advantageous by W. Jones, noting the quantity used, the heat going into the jacket water, and any other features which have a bearing on the question. Finally let an oil be used which is of high flash and of other characteristics similar to what is put forward in this letter and before an impartial set of judges, and if my position is not vindicated as to the latter being more efficient in dollars and cents regarding both the cost of oil used and wear on the engine, then an apology will be in order.—DAVID L. GALLUP, Assistant Professor of Gas Engineering, Worcester Polytechnic Institute.

Foreign Constructions Designs and Practices

The French School of Engineering

American Engineer Analyzes Features of French Designers and Makers—Fans Mounted in Radiators on Buses—Practically All Truck Tires Are of the Steel Type in Paris—How the Steel Bands Are Made

Part II

THE omnibus service in Paris is fairly good. The most striking innovation to be noticed at first glance is the appearance from the front. This is due to the use of a circular radiator with the fan within the same, much as in Fig. 1. Air is taken in through a screen at the front and is forced out radially through the peripheral interstices of the circular radiator unit. The fan diameter is about 16 inches and the space within the unit is adjusted accordingly. The radiator does excellent service. For upwards of a month, during hot weather, it was observed on buses, and the result may be summed up in the statement that one hot motor standing at the Gare du Nord on a very hot day was all that was noticed. The radiator was cool. The exhaust had the odor of excess gasoline. In addition to an apparent good efficiency, the radiators of this shape seem to be strong. Not one radiator was observed to be leaking. There is one other point: the spider in front which serves as the outboard bearing for the fan spindle serves also as an excellent protection for the radiator. A screw is placed inside of the spider through which the air is sifted. The fan blades are shaped to throw the air radially in the plane of the fan so that it passes out in the radial plane through the radiator unit.

Steel Truck Tires Numerous

In the commercial field revision is the order of the hour. Innovations of yesterday are the fractured hopes of today. The tire problem for trucks seems to be solved so far as Paris is concerned. The makers of tires seem to rejoice, for in the solving of the problem a way was found which makes it wholly unnecessary to call upon them to make good their frail guarantees. Fig. 2 shows how the tire problem was disposed of—steel tires are used. **Out of 100 heavy trucks actually loaded and going along the streets of Paris within a single week in July, 98 were steel shod on all four wheels.** One truck was fitted with steel rear and solid rubber front tires, and the remaining truck, about 2½-ton size, was equipped with pneumatics.

Of the steel shoes actually used on trucks in Paris all are not as illustrated in Fig. 2. Indeed, there is a wide diversity of sizes, but as a rule the front tires are as wide or wider than the rear tires. Fig. 2A shows a sixteen-spoke wooden wheel with a wooden felloe, fitted with a steel band slightly over 7 inches wide, made of tire-steel slightly over 1⅜ inch thick. The front wheel, Fig. 2B, has two bands with serrated surfaces diagonally disposed, with the grooves running right-hand on one band and left-hand on the other. The two bands, as they appear on the wheels, look very much like a pair of monster right and left-hand milling-cutters on an arbor. Each band on the front wheel was about 4½ inches wide. The space between the bands was about ¾ inch wide.

The idea seems to be to prevent skidding at the front and

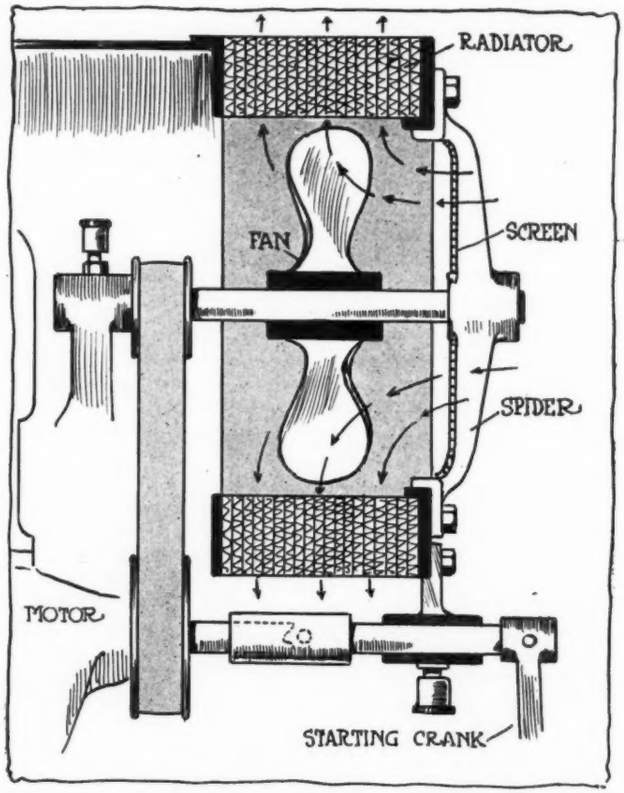


Fig. 1—Style of radiator used on Paris buses with air propeller located within the radiator and provided with an outboard bearing

to gain traction at the rear. The performance of a truck fitted with these steel bands was excellent. On one occasion, in a stone yard on the bank of the Seine, the truck, heavily loaded, went up a deep dirt road to the paved street beyond without any difficulty. On several occasions, on wet pavement, observation showed good performance of these trucks.

There is one point involved in this matter of steel-shod road wheels which should not be overlooked. The chassis springs are long of span, made of wide, thin plates, and the rear springs are, in the majority of cases, of the platform type.

Wide Steel Tires on Rear Wheels

Some trucks have wide steel tires on the rear wheels. Even widths of 12 inches are in use. In a few cases the steel bands on rear wheels are between 4 and 5 inches. It will be fair to conclude that there is no standard of width in sight as yet. The wheels, in the main, are 36 inches in diameter; a few are greater in diameter, some are less.

It might be said that steel bands are prone to leave the mechanisms of the vehicle unprotected against shock and vibration. One fellow said when this subject was broached, "There is nothing so shocking as a large tire bill!" At all events, the steel bands are not giving out; they have not been used long enough to make it possible to know how many years they will survive if they are properly set and if the service is fair. In making observation, the casualty list so far for trucks shows one truck disabled and being towed in —that truck was fitted with solid rubber tires!

Of course, there are commercial vehicles in service fitted with solid rubber tires and even pneumatics are employed to a certain extent, but these trucks are doing soft work. The army uses solids and pneumatics for hospital and like duties. The buses in Paris are fitted with solid rubber bands. Newspaper and post-office service fall into the same category. But real trucking work, where the loads are heavy, is being done in Paris on steel-shod wheels. The speeds of these trucks range between 7 and 11 miles per hour, depending upon the sizes of the trucks. The heavier trucks go slower than the lighter trucks, of course.

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Making Steel Bands for Truck Wheels

IN France where automobile trucks are being operated, running on steel feet, displacing solid rubber tires, it is interesting to note that the steel bands are more carefully made than they were in the past, as they were used on the wheels of horse-drawn trucks. In addition to a greater width of bands, and a considerably increased thickness of the metal of the bands, **the important advance is settled in the point that welding is not resorted to, primarily on account of the lack of average ability of welds; furthermore, due to the use of a superior grade of steel; metal that is incapable of being welded.**

It is not unusual to note in this newer work the use of bands up to 12 inches in width. Some of these bands have a radial thickness of wall of 2 inches. As a rule the steel bands are considerably wider than the felloes over which the bands are pressed. The band over-hang is as much as 2 inches on each side of the felloe. In putting these steel bands on the felloes, remembering that the special grade of steel used in them would be damaged by heating the bands in order to make a shrink fit, they are set by a pressing process, but, instead of being pressed on in the ordinary way, they are kneaded while they are being pressed on. In a word, by means of a plurality of hydraulic press-units mounted in a cast-iron frame with the units spaced equally around the periphery of the steel band to be pressed on, pressure is exerted radially, and this series of operations is conducted while the main press is forcing the steel band over the wooden felloe, into the position it will occupy in service.

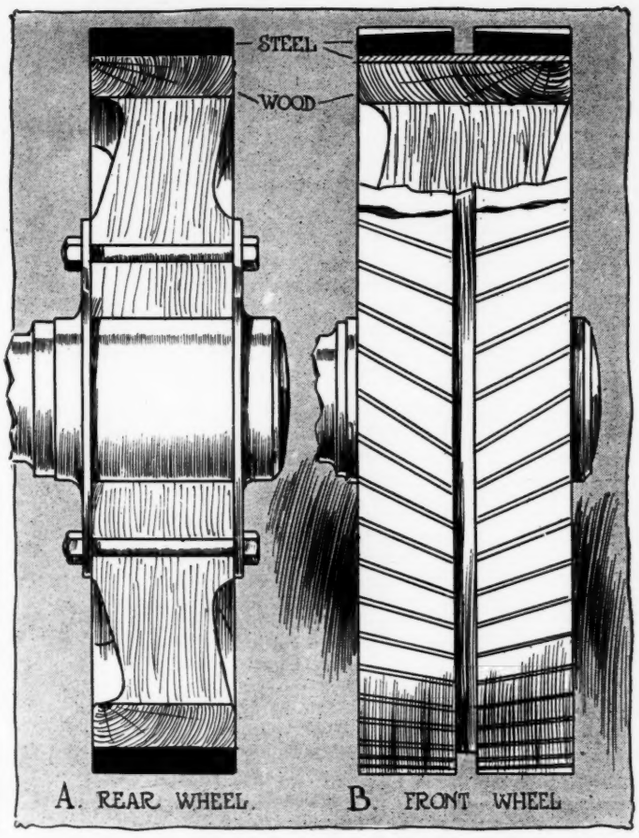

Fig. 2—A, truck rear wheel with sixteen spokes and fitted with steel band instead of rubber tire. B, front wheel of the same truck having a pair of bands with serrated faces, with serrations placed diagonally and reversed.

Speaking of the quality of the steel, it combines hardness with toughness. The hardness is due to the proper admixture of carbon, mingled with silicon and manganese. An acid steel is preferred. As to the process of production, if the ores are Swedish iron, or blends of other ores of suitable analysis, it is not so important to adhere to the acid process. The toughness of the steel is partly traced to the process; partly to the ores and their excellent characteristics, but, in the main, to the analysis which shows a mere trace of sulphur and phosphorus, not forgetting that, in the forming of the tires the metal is worked under the most favorable conditions for the birth of a fine grain and the kneading of fiber.

The billets, instead of being of the usual shape, are round and of the required thickness to furnish enough metal for one band. Instead of rolling or hammering the billets, they are first, after heating to the desired temperature, subjected to the pressure applied to the end of a mandrel which makes a hole in the center of the billet. A second mandrel adds to the size of the hole. A third, and a fourth, help in the process of enlarging the central hole. In the course of the process the hole becomes large enough so that the expanded metal forms a ring. This ring is placed in a rolling machine and, by means of rollers, the metal is subjected to pressure, and the ring is slowly but surely formed into a band, always under the condition of temperature which is likely to give birth to fine grain, and it is to the rolling process under these conditions that fiber is woven out of the fine grain. The rolled product is in the shape of the rough band near size; finishing on a lathe brings the band down to size for use on the wheel. It has been found in actual service in France, that bands, so made, last for more than 60,000 miles on heavy trucks. The cost of a set of these bands is about $200.

Part III Carburetion

by Robert W. A. Brewer

Subject Digest

One of the most important functions of the carbureter is to regulate the amount of fuel passing through the jet in a unit of time.

Under certain conditions where heat is not available an excess of fuel is necessary to make up the required quantity of vaporized gas.

A factor which comes into play and is of great importance is the variation in viscosity of the fuel due to the changes in the temperature.

Another point which must be carefully noted is the fact that although a greater volume of fuel is taken through the jet at a higher temperature, still the actual weight per unit volume of the fuel is reduced.

There are two methods of meeting and adjusting for the varying fuel conditions. One is by a variable orifice and the other by an obstruction in the fuel line at some point before the fuel mixes with the air.

Spring-actuated devices are not needed in scientifically designed carbureters and are rapidly disappearing for this reason.

A **CARBURETER jet has two functions to perform, first, that of spraying the fuel into the mixing chamber, and second, that of regulating the amount of fuel passing through the carbureter in unit time.** We have already dealt with the question of spraying and we will now proceed to discuss how different heights and forms of jets can be designed and arranged to carry out the measuring operations. Going back in history, we remember that the jet carbureter was originally unknown, as the surface carbureter was not provided with a jet, and it was with the advent of the Maybach instrument that the jet came into use and is now almost universally adopted.

During the development of the jet carbureter it was generally the custom to utilize a small brass nipple with a single hole, and the amount of fuel which issued from this orifice was controlled by the difference of pressure existing between the jet chamber and the float chamber of the carbureter.

Assuming that an engine is running at more or less constant speed, the simplest form of carbureter consists of a single jet located in the throat of a venturi tube, and the size of the orifice can then be calculated from experimental data so as to correctly proportion the efflux of the fuel to the amount of air passing.

Reverting to the second article, published last week, it will be borne in mind that under certain conditions at the time of starting up **when heat is not available it is essential that there should be an excess of fuel passing through the jet.** This state of affairs is also advisable for slow-running conditions when the air passing is not entirely concentrated round the jet and there is consequently a lack of mechanical action.

When the engine speed is increased the fuel-flow curve (as plotted, showing the relation between fuel discharge and air velocity) takes an upward trend so that at the higher air velocities the amount of fuel flowing is greater than it should be to give a correct proportioning of the mixture. At the same time the amount of air flowing is in a falling ratio. In other words, **the air curve droops while the fuel curve rises.** It is necessary, therefore, to take certain precautions so that this tendency can be overcome, and we, therefore, find that modern carburter development has been concentrated, to a great extent, upon dealing with this particular matter.

There is another factor which also comes into play, namely, **the viscosity of the fuel which is a function of its temperature.** I have shown from time to time how that Rummel's formula for the rate of fuel discharged from a jet applies.

$$C_1\left(\frac{Q}{t}\right)^2 + C_2\left(\frac{Q}{t}\right) = h$$

where C_1 and C_2 are constants, being the co-efficient of discharge for the orifice.

In previous tests which I have made to find out the value of C for gasoline jets of the dimensions ordinarily in use, working from the formula generally used in such cases.

$$Q = C\omega\sqrt{2gh}$$

where Q is the discharge in cubic centimeters per second,
c is the co-efficient of the discharge,
ω is the area of the orifice in square centimeters,
g is the acceleration due to gravity in centimeters per second,
h is the head in centimeters over the orifice.

I have found from numerous experiments with jets whose lengths were approximately five times their diameter that the co-efficient of discharge of gasoline at a temperature of 60 degrees Fahrenheit varied from 0.738 to 0.770, the mean co-efficient being 0.7. Unwin gives 0.77 as that for water in his Treatise on Hydraulics.

Now this feature gives the designer some scope for retarding the flow of fuel at high speed, and it has been taken advantage of in some instruments by interposing a resisting medium in the fuel path. **In other cases an obstruction has been placed immediately outside the jet orifice so as to throw back the issuing stream upon the orifice.** I have found from experiment that a discharge from such an orifice is considerably affected by particles of fuel dropping back, but it is a difficult matter to form any law upon this subject.

There is one other important thing to be borne in mind, namely, **the effect of temperature upon viscosity, and at the same time upon its specific gravity.** One can see that although a greater quantity of fuel with a reduced viscosity passes through a given orifice in unit time, yet the actual weight of that fuel is also reduced but by a lesser proportion on account of its rise of temperature.

Passing now from the fixed-jet and variable suction instrument we will go on to the varying-jet and constant-suction type. This type has been evolved in order to overcome the difficulties referred to at high speeds, and **it appears in at least two types, those where the orifice is varied in dimensions where the fuel meets the air stream, and those where this adjustment takes place at some point in the fuel line before the fuel actually leaves its passage to mix with the air.**

In the latter type of instrument there may be some diffi-

culty on account of the wear of the moving parts exposed to the air stream, but this is to some extent counter-balanced by the increased spraying effect due to the arrangement. On the other hand, with the submerged type of metering pin the conditions are reversed.

When one comes to consider a varying orifice of this type scientifically, one is up against a problem of some importance and difficulty, for we find that **with a pin of straight taper the increase in the area of the orifice is not proportional to the movement of the pin.** Furthermore, we find that **as the pin is gradually withdrawn from the orifice the ratio of the length of the orifice to its effective area varies from moment to moment.**

There is still another difficulty which I have found, due to the metering pin not always lying central in the hole, and I am of belief that it is for this reason that one often experiences erratic behavior in this type of instrument. For instance, I have found that with an increasing area of from 1.02 square milimeters to 3.10 square milimeters, the co-efficient of discharge varies from 0.783 to 0.500. In another case where the areas were smaller the co-efficient of discharge rose from 0.415 to 0.790 as the effective area increased. In another case with an engine on trial at 500 revolutions per minute giving 8.25 boiler horsepower, the co-efficient was 0.795; at 1,000 revolutions per minute giving 19 boiler horsepower it was 0.568, and at 1,800 revolutions per minute giving 26 boiler horsepower the co-efficient fell to 0.482.

In order to get over this difficulty I have designed a carbureter combining the characteristics of the two types before mentioned, and **with such a combination it is possible to obtain any desired results with regard to air and fuel flow.** Furthermore, such an instrument can be adjusted within certain limits so as to surmount the difficulty of the **fixed-fuel flow at starting.**

The multiple jet of the Polyrhoe has many features to recommend it in respect to the accuracy of the jets, as we all know how difficult it is to make small jets with sufficient acccuracy, and as a further expansion of this type there is the jet in the form of a narrow adjustable slit in the Ideal carbureter.

Here we have an instrument with a right-angled movement in which as the air valve opens it uncovers a shutter over the gasoline orifice, so that when the carbureter works at its predetermined depression the efflux of fuel from each unit length of the slit is the same, neglecting, of course, the friction at the ends of the slit. Widening the slit by means of an adjusting screw gives a uniform proportional increase of fuel flow throughout the range of working.

In the Polyrhoe, the action is to reduce the width of the air slit, but the result is the same in each case.

There is one ruling factor which has to be observed in all these types of instruments, and that is the gradual action of the free moving parts. A free moving part is often condemned because it works badly, and it can only be made satisfactory by accurate workmanship and a suitable dashpot. The expense of carbureter manufacture is generally a function of the accuracy of workmanship, and for this reason I have endeavored to eliminate accurate workmanship of importance from my new design.

It is unfortunately a fact that a large number of wasters are made in modern high-class carbureters on account of the lack of extreme accuracy and exact clearances, and for American practice, particularly where large output is concerned, there should not be too great a dependence upon accuracy of manufacture.

The Holley carbureter undoubtedly scores by its absence of moving parts which either would require accurate machining or careful adjustment. Too much dependence must not be placed upon adjustments of spring-actuated devices. These are fortunately rapidly disappearing, as in scientific designs they are not necessary. **Our present knowledge enables us to design rather than to compromise in carbureter work.**

When the Carbureter Is Wrongfully Blamed

THE most abused part of a motor is the carbureter. Perhaps it is something which has been handed down to us from the early days of automobiling that leads us to grab a wrench and start for the carbureter whenever the motor misfires, overheats, carbonizes or does any of the hundred and one things that a balky gasoline motor can and does do.

One of the most common things that a carbureter is blamed for is the failure of the motor to throttle down. One man complains that he cannot get his car to run any slower than 10 miles an hour on high speed. He states that he is tired of trying to improve his trouble and that whenever he changes the adjustments things become worse instead of better. **He forgets his spark-plugs and the fact that after a time they become sooted or the electrodes become farther apart on account of the heavy work they are called upon to perform during a hard season of automobiling.** If he will close up the gaps on his plugs he will probably be able to throttle down to 5 miles an hour without trouble on high gear. The spark-plugs should not have their gaps further than .02 inch apart when running on the magneto, as is habitually done in most cases. The magneto that is turned over at the same speed as the motor does not generate as high a current when the motor is running at 200 revolutions per minute as it does when the motor is running at 1,000 revolutions. Naturally **the current is not strong enough at low speeds to jump the increased gap, and as a result there is an irregularity in the running of the car when the speed drops to the point where the spark does not occur.**

Another man, whose motor is continually fouling even after he has cut down his mixture until it is as thin as possible, forgets that he is using a bad oil in his effort to make his running inexpensive. Even a little bad oil can carbonize badly. It does not take an over-supply. It is a fallacy to try to save money on oil. The best is none too good for the automobile engine. After the carbureter has been adjusted so that the car runs smoothly it is seldom that it has to be changed unless to meet a decided change in climatic conditions.

Overheating may be due to too rich a mixture, but the water circulating system should come in for its share of suspicion. Not long ago an enthusiastic automobilist whose car was overheating discarded a perfectly good carbureter because of this trouble. He was greatly elated because he had received what he thought to be a handsome allowance for the carbureter which had formerly been upon the motor and which he thought to be out of commission. After the smoke cleared away he had bought another carbureter of the same make he formerly had used and another water pump to take the place of the corroded article he had been depending upon. Besides this he had adjusted the fan belt which the garage man had told him was slipping badly and promoting the overheating process.

Smoke due to an over-supply of oil is sometimes blamed upon the carbureter. **Oil smoke is bluish in tinge, while carburetor smoke is a black or dak gray.**

Continual tampering with the carbureter leads nowhere. It is necessary that adjustments be made systematically.

System of New York Splitdorf Service Plant

Gotham Department of Magneto Manufacturer Organized to Give Users of Splitdorf Products Prompt Service

A PENNY saved is a penny earned. In these seven words lies the abstract of commercial wisdom of the past 40 centuries which a few years ago became the foundation of a very important economic idea, that of scientific management. The principle of scientific management is the elimination of futile effort and of waste of material, to which factors is due the high production cost of manufactured articles. Carefully organized and systematically conducted experiments have shown that even with so-called ideal installations in factories and shops half of the power and labor consumed goes to waste, that is, it is expended without the production of a result or value. In other words, an efficiency of only 50 per cent. is obtained from the power and labor expended.

High efficiency is to be desired by everybody. No one wishes to pay for more than he receives, and this progressive turn of mind is at the bottom of all economic and social problems. The proposition remains the same whether the parties are called buyer and seller, employer and employee, or what not. Every one objects with equal vigor to the high cost of living, to extortion by buccaneering garage men and to all the other nuisances of modern life.

The automobile owner today recognizes that when he buys an automobile, he may expect a certain amount of service from it, for a reasonable cost of upkeep. He also knows that if anything goes wrong with the car, even through his own fault, he is entitled to a good repair job done at a comparatively low price. He demands from the maker of the car every protection conceivable against the outrageous charges of the old-time repair man.

Service Needed for Accessories

The same applies to the parts of every car of good make. The fact that a car manufacturer buys carbureters, ignition or lighting systems from a special maker of such accessories does not alter the condition that he must be ready to give efficient and economical service to the users of his products, when these respective accessories are in need of repair. In the case of large accessory manufacturers, the latter are beginning to organize their own service departments, thereby taking a great deal of work off the car maker, to whose lot it would otherwise fall. In this respect, magneto manufacturers are making especially energetic efforts to serve the users of their products promptly and at the lowest possible charge.

One of the most recent undertakings along this line is the central service department of the Splitdorf Electrical Company, 18-20 West Sixty-third street, New York City. This department is organized in a way like an automobile service department, the principal points of the business and its operating system being given below.

The service department occupies the ground floor and basement of the address mentioned. Office, retail salesroom and shop are located on the ground floor, while the basement contains a machine shop and garage room, in which latter magnetos and lighting systems are installed on cars. Furthermore, stockroom and shipping department are located in the basement. The number of men employed in these practical departments, outside the sales and office rooms, is twenty-seven.

Splitdorf System Has Four Forms

Due to the fact that it has to deal only with products of a very few classes, the system used by the Splitdorf company is rather simple, yet elaborate enough to permit of recording every essential detail of the service work done by the company. The purpose, to which this system is adapted, is twofold: first, it is a means of controlling the activities of the workers in general and of seeing whether all the necessary repair work is being done; second, it affords exact records of the repair costs and permits of placing the minimum charge on every job which is done in the establishment. Thus the system works out to the advantage of both the company and the user of the company's products.

The system itself depends for its execution upon a number of blanks which are handled by the company's employees as the work passes through their hands. Four forms, which are printed on three cards, are all that are used. Figs. 2 and 3 are repair orders, Fig. 4, being the reverse of Fig. 3, is a repair cost form, while Fig. 1 is the stockroom inventory card used to keep track of materials.

Repair work, which constitutes the bulk of the activity of the Sixty-third street place, is handled in the following manner. When a magneto, coil, etc., is received, a form is filled out which accompanies the accessory through the service department while it is being worked upon there. An entry is also made in a book.

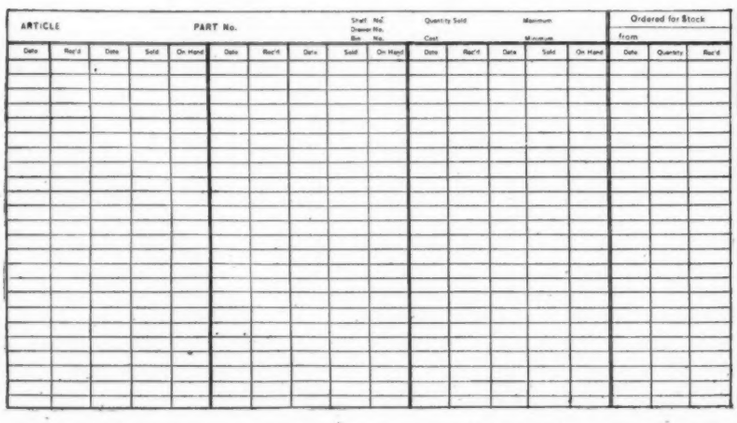

Fig. 1—Stockroom record card used in the New York service department of the Splitdorf Electrical Company.

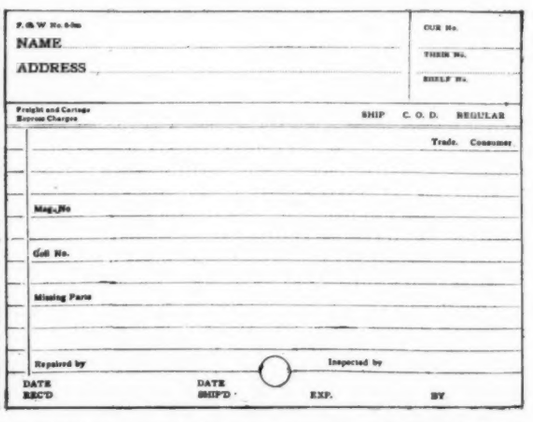

Fig. 2—Repair order card used in the Splitdorf service department when repair jobs are received by express

Then the accessory is sent into the shop where all the necessary repairs and replacements are made. The work being done, the finished product is either sent to the owner or held for delivery, depending on circumstances. The working orders which accompany the objects to be repaired on their way through the shop are printed on their reverse sides for recording the cost of the work. These cost records are used as a basis for the bill delivered with the finished repair.

Taking up these several operations in turn, attention must be called to the fact that accessories brought into the office of the department by their owners are sent through the shop equipped with a different repair card than the goods which arrive from out-of-town by express. Fig. 3 shows the card which is filled out in the first case, Fig. 2 that used in the second. Name and address of the owner, as well as of details relating to the magneto or coil and the repairs necessary on it, are entered on either card, whatever one is used. If the magneto is brought into the place by the owner, Fig. 3 is made out, the stub at the bottom, which is detached and delivered to the owner, serving as a receipt. In the case of accessories arriving by express, no receipt except an acknowledgment per letter is used.

Whenever a device is received by the Splitdorf company and a repair work order is made out, the accessory is entered in a record book under the reference or job number. Two separate books and, consequently, separate series of job numbers are used for the articles arriving by express and delivered by the owner himself. No numbers of one series duplicate those of the other series. Incidentally, it should be noted that the repair orders for magnetos and coils received from out-of-town are blue, while the form, Fig. 3, is tan.

These forms being filled out the magneto—we will speak of magnetos only, to avoid unnecessary complication—is immediately delivered into the shop. Here work is started on it at once. This expedition is made possible by the distribution of work in the shop, where every man works on just one sort of work. The magneto is first turned over to a man on the first bench, who completely disassembles it and puts the parts in a box, which is moved along the bench. The foreman goes over the parts, sees what repairs are needed and either writes instructions on the card, or gives them to the workers who do the specific repairs. In this way, the owner is often saved the expense of a new part by a minor repair. The parts are then repaired or replaced, as ordered by the foreman, after which the magneto is assembled again, inspected and tested for the perfect operation of its various parts. The man who made the repair then fills out the back of the repair order, which is printed as Fig. 4. Materials used are reported on this blank, and so is the time used in repairing the magneto. The charges for material and labor are entered on the card in the office, and the bill is made out from them, being delivered to the customer with his magneto.

When a repair is completed, the magneto is put into the storeroom and is there placed in a compartment by itself and held until the owner calls for it, if he had brought it in himself. If the magneto had arrived by express, it is returned to the owner as soon as the repair is done.

The stockroom of the service department, in connection with which the New York retail store is operated, contains both complete magneto, coil and lighting assemblies and all the parts of the same. These articles are numbered, according to the company's factory drawings, and are kept in orderly arranged shelves. To keep track of them, a record card is used for every type and size of part, and these cards are kept alphabetically according to the names of the articles. The inventory file card, Fig. 1, is so designed that whenever any quantity of a part is received, it is entered on the card, together with the date it arrives. Likewise, outgoing material is recorded on this card, and a monthly balance is made which affords a clear review of the stockroom and its business. The records of incoming material are checked against the bills of lading and the factory invoices, while the outgoing material must correspond to the material records appearing on the backs of the repair orders.

The labor charges on the repair work orders must, on the other hand, total up the sum of working time recorded by the clock cards of the shop workers. This phase of the subject, which has been repeatedly treated in THE AUTOMOBILE, does not require to be taken up again in this article.

One interesting point of this system is that, unlike other recording systems, it does not call for the services of any men specially occupied with its execution. The store clerks receive the incoming magnetos, coils and so forth, and sign for them if they arrive by express, or make out a repair order with a receipt stub when the accessories are brought in by their owners. From the orders complementary to express shipments the blue cards, Fig. 2, are made out, which, like the cards, Fig. 3, serve as permanent record accompanying the devices through the shop and as blanks for the cost records, from which the bills are made out. The latter work is done by a bookkeeper or office clerk, and is ordinary office work really outside of the special service system. To put the whole situation in a nut shell, the system is carried out by the entire force employed in the establishment, thereby relieving the individuals of any great measure of connection with it. This makes the whole system so much easier to enforce, as with the work the responsibility is shared among the workers. Consequently, the chance of an error is also materially reduced, as every record form passes through several hands, whereby the probability of its being found out is greatly enhanced. Thereby one of the principal aims of efficient management is realized.

REFERENCE No. 2067 job
DATE November 23 1912
NAME Geo. W. Isgrim
ADDRESS 2455 Bway, New York
ARTICLE Spl. magneto B
MAG. No. 17213 COIL No. 29003
REMARKS cylinders miss at low speeds, one also on high. Go over distr.
MISSING PARTS
PROMISED Dec. 1, 1912

REFERENCE No. 2067 Receipt to owner
DATE November 23 1912
ARTICLE Spl magneto B 12/17213
NAME Geo W. Isgrim
PROMISED Dec. 1, 1912
This Claim Check is void after 30 days from date.

REPAIRS

	CARBON BRUSHES		
	GAUZE "		
	BREAKER BAR		
	PLAT. SCREW		
	" RIVET		
	LABOR Hours.		
	TOTAL.		

Repaired by Inspected by

Fig. 3—Repair work order used for goods brought by their owners. Fig. 4—Repair cost blank on back of Fig. 3

Placing Truck Back on Road—Selden Patents Not Now in Effect—Motor Can Be Used as Air Compressor—Trouble Traced to the Spark-Plugs—Carelessness Responsible for Clutch Trouble—Origin of Venturi—Motor Overheats

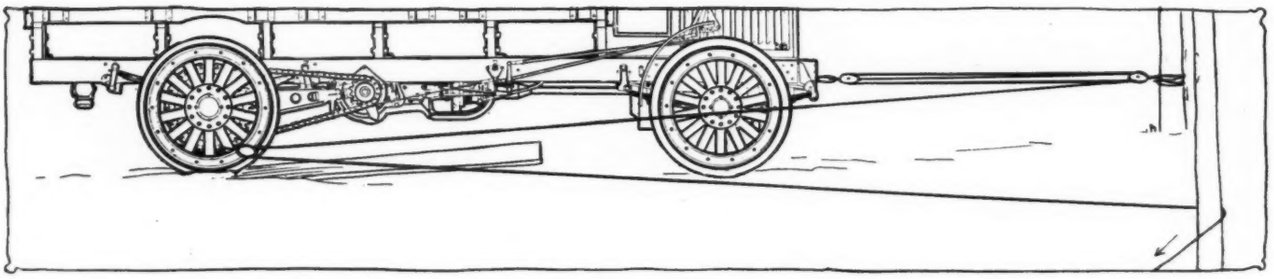

Fig. 1—One way of using block and tackle to move stranded truck by its own power

Putting Truck Back on Road

EDITOR THE AUTOMOBILE:—In case a 1-ton truck slides off the road into soft ground, is there a way of putting the truck back on the road with a block and fall under its own power?

Jersey City, N. J. CHARLES NEU.

—This is a case where the particular circumstances surrounding the truck and its position are of the utmost importance. A block and fall could be rigged up in such a way that it would exert a pull on the truck and would move it a short distance and then after rearranging the apparatus another distance gained until the truck was once more upon hard ground, if the conditions were right, while under other circumstances it would be impossible to apply the block and fall.

Assuming that the truck were in some position where the block and fall could be used to pull it out a little distance at a time, it would be necessary in the first place, assuming that the wheels spun around without securing traction, to stop the differential action by locking one of the wheels so that it could not revolve. It could be roped in place. The block and fall could then be attached as shown in Fig. 1. The tackle is attached to a tree or post and to the front or rear of the truck, depending upon the direction in which it is to be pulled. The loose rope is then secured through the means of another block to the rear wheel and the end of the rope passed around a tree to hold whatever advantage is gained when the motor is started. A plank is then placed in front of the wheel in such a way that a slight forward movement of the truck will bring the wheel up on the plank and put it in a position to secure traction.

A far better way of getting out of soft ground than by using a block and fall is to put a plank under each rear wheel as far as it will go. The plank is then tied to the wheel in the manner shown in Fig. 2. When the wheels start to revolve they will carry the plank under the wheel with them and the result will be that traction is automatically given.

A chain-fall could be rigged up if the truck is at some place where the fall could be attached. Very often also the shovel can be plied with good effect or a chain wrapped around the wheel to form a mudhook. If the wheels will not revolve the chains should be discontinued.

Selden Patents Now Expired

Editor THE AUTOMOBILE:—Will you kindly answer the following in your next issue of THE AUTOMOBILE?

Can anyone build an automobile to order for a customer without infringing on the Selden patents? This person would no doubt continue to build a few machines for different people wherein he would place the best parts of their kind on the market today. I am sure that there would be trouble for him in regard to the above named patents. If the patents are still in force kindly let me know, and the length of time they can still be in force.

Newark, N. J. A STEADY READER.

—As far as the Selden patents are concerned there need be no fear, as they have now expired. The only thing you will have to guard against will be the installation of other patented devices which are, to say the least, rather numerous in automobile construction. By using standard parts and devices, however, no harm can be done, even in this direction.

Small Motor as Air Compressor

Editor THE AUTOMOBILE:—I have a small marine type gasoline engine which I wish to convert into an air compressor for charging a storage tank for garage use at maximum pressure of 150-200 pounds. The engine is 3 inches by 3 inches; rings fit tightly and everything is in good working order. Water-cooled.

Please advise me of the best way to make the change.

Can you give me the address of the Waterhouse Welding Company?

Prattsburgh, N. Y. H. G. MORGAN.

—You do not mention the type of construction of the motor or if it is a two- or four-cycle. The principles would be the same however in any case. Assuming that it is a two-cycle motor all that would be necessary would be to cut down the compression space until there is nothing left but just enough for piston clearance, say 1-8 inch. An outlet pipe with a ball check is then installed, the check operating, of course, so that the air does not escape from the tank back into the motor? In the case of a four-cycle motor the only difference would be that besides cutting down the compression space to practically nothing, the exhaust valve will have to be locked and the intake valve made to

act automatically. That is the cam action should be removed and a spring installed which will be just light enough for the piston to draw up on its suction stroke. It will then act automatically. A safety valve loaded to the desired pressure could be put on the tank or a gauge installed which could be watched while the power is on.

Users of Air Starting Systems

Editor THE AUTOMOBILE:—Which 1912 and 1913 model automobiles are using compressed air starters?

Jamestown, N. Y. J. E. WHITE.

—Among the prominent users of air starting devices for the season of 1912 were the Winton, Chalmers, Parry, McFarlan, Austin, Amplex, Berkshire, Midland and Nance. The makers have not all fully determined on their 1913 starters as yet, although it may be stated that the trend is toward electricity and acetylene. The above will probably continue with the air starters for 1913.

Pounds When Running Slowly

Editor THE AUTOMOBILE:—I have a four-cylinder, four-cycle Cadillac. When running slowly the fourth cylinder misses. It does not fire at all as it should; it does not pick up quickly when changing for higher speed but seems to be all right when running rapidly. It will start pounding when running slowly, the cylinders soot up quite badly and so do the spark-plugs in the fourth cylinder. I have a high-tension magneto of the Bosch make. Some think it is in this and others tell me to use a different spark-plug. Do you suppose it could be in the piston rings? Would like to hear from you about the trouble through Letters Answered and Discussed.

Petoskem, Mich. J. OLDHAM.

—Your trouble is either due to bad carbureter adjustment, a leaky bushing around the intake valve, improper spark gap or a combination of these. Try a little richer mixture on low speed and renew the bushing surrounding the inlet valve stem on the number four cylinder. The latter trouble is very common and often unsuspected as there is no perceptible hiss as is the case with other gas leaks. Air is sucked into the cylinder around the leaky bushing and the result is a lean mixture in the affected cylinder. The spark gap on a magneto ignition system should be about .02 inch. On the battery system the gap can be as large as .045 inch with satisfactory results. Close up the gaps of the plugs and adjust the carbureter before renewing the bushing so that in case the latter is in good condition you will not have had the expense of fitting a new one unnecessarily.

Origin of the Venturi Tube

Editor THE AUTOMOBILE:—Will you kindly tell me through your columns the origin of the name Venturi tube now frequently mentioned in carbureter construction. What was its original form and application?

Penaski, N. Y. J. H. D.

—The origin of the Venturi is traced to G. B. Venturi, an Italian physicist, who lived between the years of 1746 and 1822. The purpose of the tube was to reduce the resistance to air flow. In Venturi's explanation of the tube, 1791, he states that the quantity of air that would pass through in a given time under a given depression would be multiplied by four as compared to a plain tube, provided the two inverted cone frustrums of which it was composed could be so arranged that the convergent angle of one of the cones was fixed at 30 degrees while the divergent angle of the other was fixed at 7 degrees. The designs of the Venturi used in carbureter work vary materially from the designers' dimensions, as practice does not render the latter feasible.

Did Not Lubricate His Clutch

Editor THE AUTOMOBILE:—I am having some trouble with the clutch of my model R, 1910 Reo touring car and although I have had an expert take same apart and thoroughly cleanse the plates he has been unable to do anything for me. The trouble is as follows:

Instead of being able to start the car gently and with increasing speed by gradually releasing my foot from the pedal nothing happens until the pedal is almost all the way up, and then the car starts with a jerk, often killing the engine, and is naturally very hard on the transmission and driving gears in the rear axle, not to speak of the wear on tires. Experts and Reo owners have frequently told me to wash the clutch plates out by squirting in gasoline through the plug hole for that purpose. This I have frequently done, sometimes squirting 1 gallon of gasoline through this hole. This does not do any good but I find that by putting in about one teaspoonful of fairly thin sewing machine oil it cures the trouble for two or three days, when the clutch will again become fierce. Another trouble is as follows:

On the pressing of the clutch pedal the clutch does not seem to properly disengage and instead of the driving shaft between the clutch and the transmission box ceasing to revolve when the pedal is depressed it rotates at practically the same speed as before, the consequence being that when the gear-shifting lever is moved in any desired position either to start or change speeds, a horrible grinding noise is the result, caused, of course, by the gears revolving so rapidly that they will not mesh until their motion is stopped, when of course they will mesh.

It is a most uncomfortable feeling, as I am always in fear of stripping the gearset or breaking some part of the driving mechanism in the rear axle, and if there is any remedy for this I would be glad if you would kindly advise me. I am confident that the plates in the multiple-disk clutch are perfectly clean and therefore the trouble is not caused by any dirt or foreign matter between the disks. I have never put any oil in the clutch except as above described, as I always understood that this type of clutch was supposed to be run dry.

Macleod, Ont. R. H. HILLIARD.

—The trouble has developed because you have not lubricated your clutch. The proper oil to use in the Reo 1910 clutch is a mixture of kerosene and medium cylinder oil in about equal pro-

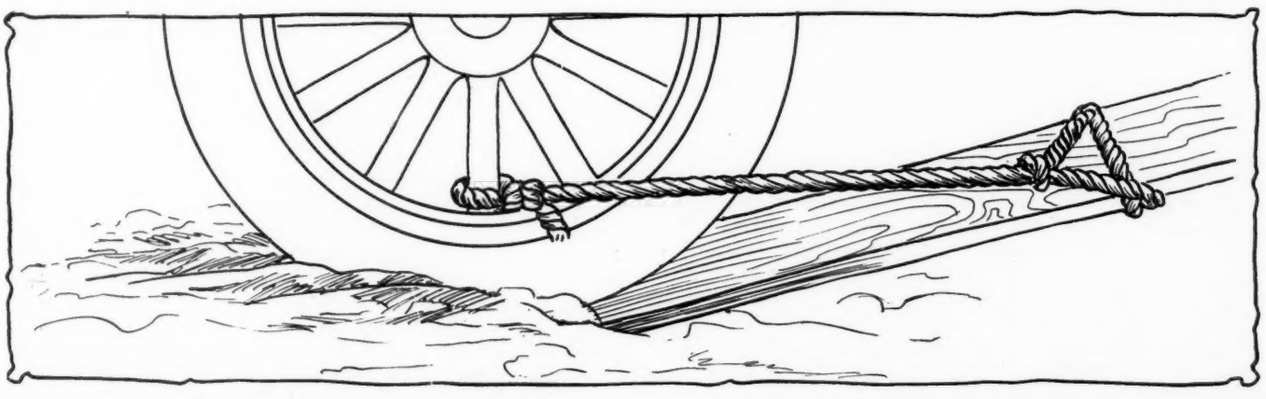

Fig. 2—Scheme sometimes employed for moving truck which has gone off road into soft ground

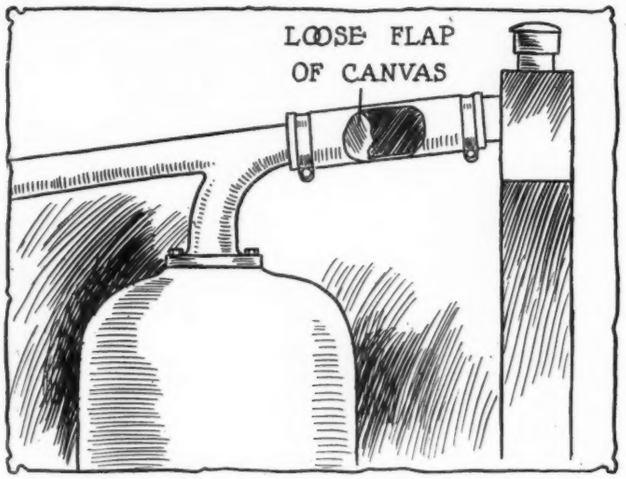

Fig. 3—Where overheating trouble sometimes lies unsuspected

portions. The Reo 1910 clutch gave trouble in some respects and it has been entirely redesigned, heavier plates lined with asbestos fabric new being fitted. A view of this clutch is shown in Fig. 4. The plates in the 1910 Reo gave trouble by their liability to distortion, especially when they had been insufficiently lubricated and this is the cause of your trouble. New plates will be necessary. It is possible that the 1912 type of plates could be fitted to your car without much expense. This matter should be taken up with the factory. Another part which is probably worn is the clutch guide bushing which surrounds the end of the crankshaft. The bushing should be carefully examined and, if worn, renewed.

Sudden Case of Overheating

Editor THE AUTOMOBILE:—Will you kindly give me a little information? I have a 1910 Oakland car which for the past season has been overheating very badly. The trouble started all at once. On Saturday the car was working splendidly on the worst hills in Vermont. On Monday it would get hot in running 3 miles, regardless of what oil or mixture of gas was used, and continued to work that way since. The richer the mixture the cooler the car would work, but with a decided slump in power.

2—I have had to replace the pinion shaft and tube on account of a broken roller bearing. The large differential gear is sadly worn. If I set the pinion so that the noise is at a minimum the car works hard. If I mesh it deeper it growls badly but will work much easier. Would you advise a new gear and will you kindly tell me how I can be certain that the pinion and gear are meshed properly? Could a worn gear cause a car to work hard enough to overheat?

Brasher Falls, N. Y. P. E. KENNEHAN.

—The trouble is either due to carbon trouble or an obstruction in the cooling system. First, have the carbon removed and if the trouble still continues, examine the hose connections to see if a loose flap of canvas caused by the rotting of the hose could have interfered with the water circulation. The radiator may be also flushed out with a few pails of boiling water to which has been added a handful of soda. It very often happens that oily water is inadvertently poured into the radiator and forms a non-conducting coating over the surface of the radiator. While this would not be apt to give such a bad case of overheating as you seem to have, still, in combination with hilly country, a rich mixture and a retarded spark, the tendency to overheat would be great.

2—It is necessary for you to get a new gear at once or else you will be in the unfortunate position of having to purchase another pinion also. It is useless to attempt to get a worn gear to mesh with a new pinion and to act noiselessly. It is not likely that this is the cause of overheat, although it may be if the resistance opposed to the motor is tremendously high. Jack up the rear wheel and see if it is very hard to turn the wheel around by hand. You can tell when the teeth of the gear and pinion are in proper mesh when there is no lost motion between them and when they run easily together. Improper mesh will be indicated by silence, although it can be detected by the eye to a certain extent if the light is good.

Specifications Show Good Truck

Editor THE AUTOMOBILE:—Will you kindly give me your opinion on the following specifications, for a 2-ton truck, allowing 30 per cent overload?

Do you consider the material specified of the best?

Does a truck with the following specifications compare favorably with other trucks selling at $2,800?

Specifications as follows:

Continental motor, 4 1-8 by 5 1-4, in sub-frame.
Clutch, Helie Shaw No. 5.
Transmission, Cotta, selective, three speeds and reverse.
Timken bearings connected on jackshaft.
Jackshaft, Timken, full floating.
Axle, rear, Timken, 2 1-4 by 3 3-8.
Axle, front, Timken, 1 3-4 by 3.
Frame, channel steel, 7 inches deep, 2 1-2 inches wide.
Springs, semi-elliptic, 40 inches long, 3 inches wide, front.
Springs, semi-elliptic, 54 inches long, 3 inches wide, rear.
Wheelbase, 140.
Front wheels, 36 by 5, solid tires, S. A. E. equipment.
Rear wheels, 36 by 3 1-2, dual tires, S. A. E. equipment.
Timken bearings in front and rear wheels.
Harrison radiator, suspended on coil spring.
Ignition, Bosh dual and Atwater Kent.
Carbureter, Stromberg.
Brakes, contracting on rear wheel drum and jackshaft.
Wheels, to have 2 1-4 inch spokes, 14 inches each wheel.
Hermer, steering wheel, 20 inches.
Shaft connecting clutch and transmission shaft connected with Blood Universal joints.
65 per cent., of load to be carried on rear axle.

Erie, Pa. GEORGE MCLAUGHLIN.

—These specifications are good and as compared to three of the standard trucks of that size which have made a name for themselves and which are satisfactory in every respect show that this truck is the equal of any.

Can Fit Vacuum Oil Feed

Editor THE AUTOMOBILE:—I am overhauling an old six-cylinder car and would be very glad if you can advise me through Letters Answered and Discussed as to the simplest way to install

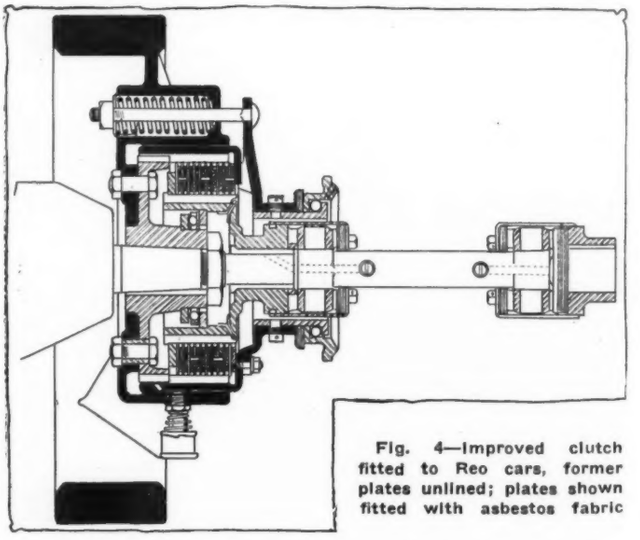

Fig. 4—Improved clutch fitted to Reo cars, former plates unlined; plates shown fitted with asbestos fabric

a constant level oiling system. Motor is lubricated by splash alone and no provision made for maintaining level, the practice of dumping in more oil from time to time as practiced several years ago being the only method of lubrication. Lower half of crankcase is divided with usual partitions between each cylinder, top of these partitions being about what is considered the normal oil level. It would be possible to establish a circulating system by providing a tank alongside of bottom of crankcase, thence overflow to tank, etc., continuously. I understand, however, that there is a simpler system in use in which a syphon effect is utilized in some way, this plan having been in use in Everitt cars as I understand it, same consisting of a tank from which oil is let into the crankcase by quantity sufficient merely to maintain predetermined level. In the old motor above referred to the division between each cylinder in the bottom of the crankcase—in short, between each oil well—is drilled through with a 3-8 inch drill at the bottom of the crankcase so that all the wells are in communication. It seems to me that by having the holes the divisions are made useless as all the oil would quickly run to one end or the other of the crankcase in ascending or descending a grade. Would it not be advisable to plug them up as with a means of maintaining a constant level flush with the top of the division walls all requirements would then be taken care of?

2—Also can you tell me of any parts manufacturer who makes a transmission and clutch as a unit as shown in cut, Fig. 5, page 1127, in your issue of November 28? I wish to purchase such a unit and would appreciate any information you can give, as I have been unable so far to locate any manufacturer of same.

New York City. C. J. WARD.

—A vacuum system such as used in the E-M-F cars could readily be installed. This system works as follows:

The oil tank is an integral part of the crankcase and is located on the left hand side of this casting. The capacity of the reservoir is about 1 gallon. The tank is filled through an opening in the forward end which is covered by a screw cap so made as to screw down tightly so as to form an air-tight fit over the oil reservoir. This tightness is an absolute necessity to the system as will be seen later.

The oil is fed into the crankcase splash troughs by vacuum. Two feed pipes extend from the bottom of the tank into the crankcase. These pipes are U-shaped, one end leading into the bottom of the tank, while the other projects through the bottom of the crankcase, to a point about five-eighths of an inch above the bottom. When there is no oil in the crankcase, but the reservoir is full, it can readily be seen that there will be a flow from the reservoir into the crankcase by means of these two pipes. When there is sufficient oil in the crankcase to cover the pipe ends, they will be sealed so that no air can enter them and hence no more oil may flow out of the reservoir.

This system automatically supplies the oil that is used just as rapidly as it is needed and keeps the oil level constant, since the pipes are continued into the crankcase for just such a distance as to provide the correct level for the splash of the connecting rods. The oil cannot rush into the crankcase and flood it when filling the tank as there is a valve which closes automatically when the screw cap is removed. There is an opening directly under the valve in the bottom of the oiler, through which the valve may be taken out for inspection in case of leakage. Any leakage would be detected while filling the reservoir.

The splash of the connecting-rods throws a spray up into the cylinder and fills the crankcase with oil vapor. This oil vapor lubricates the entire motor, including the camshaft.

The camshaft gears are lubricated through an oil hole and by means of grease cups which are provided for this purpose.

In order not to waste oil certain precautions must be observed in the monthly cleaning to which the crankcase should be submitted. The filler hole cap, on the oiler box must be removed so that the oil does not pour into the crankcase. The drain in the bottom of the crankcase is then opened until all the oil has poured out, when the drain cock is closed. Kerosene should then be poured into the breather pipes and the motor allowed to run for about fifteen seconds. The drain cock is then opened and the kerosene allowed to run out. After the drain cock is closed and the filler hole cover screwed firmly back into place the oil will run into the crankcase until it reaches its proper level.

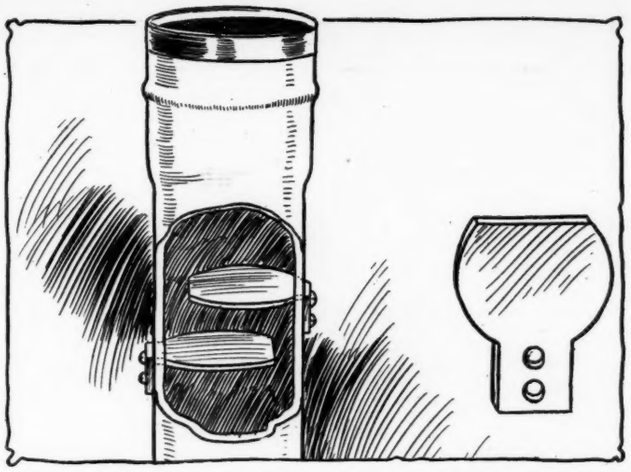

Fig. 5—Baffle plates can be fitted in breather to check oil spouting

It would be advisable to plug the division holes.

2—If you will apply to Victor W. Page, care of the New Departure Manufacturing Company, of Bristol, Conn., who submitted the sketch you will no doubt find where such a unit can be purchased because the oil will, as you say, run down to the rear end of the crankcase in climbing a hill. A point which should be observed in doing the drilling work necessary on this job is to remove all traces of metal borings as they might damage the motor seriously.

Position of Oakland Balance Weights

Editor THE AUTOMOBILE:—Kindly state the best method of setting the geared counterbalance on crankshaft of a two-cylinder 1909 Oakland engine. I do not get as steady a running at high speeds. I see no marks on gears but get them balanced by sighting them horizontally.

2—Can you suggest any remedy for oil being forced out of breather at crankcase when cylinder has apparently good compression? I added one screen.

3—Will a set of new clutch plates on slow speed in transmission prevent the very noisy hum when starting? What is the best oil to use with this clutch?

Oak Park, Ill. J. L. DAVIS.

—The only method is to take a trial setting and observe how the motor runs, then try another setting and see if running is better or worse. The first and second settings should be one tooth apart on the gears. That is, if the two teeth that are in mesh on the gears are marked in the first test the second test will consist of moving the tooth over one point on one of the wheels. The running should be observed on each test and the direction in which to make the changes will soon be noted. Should you be unable to secure silent running under any adjustment it will signify that the gears are worn and should be replaced.

2—The trouble is probably in the design of the breather which is not properly baffled. In Fig. 5 a method of constructing a new breather pipe is outlined. Two opposing baffle plates are fitted for the purpose of catching the oil thrown out. The breather is easily made; the upright piece of the breather may be the same as you have now. The two baffle plates are cut to suit the inside diameter and may be made of sheet brass. A gauze screen across the top will complete it.

3—A new set of plates would have a good effect in the direction of noise. The best oil to use with this clutch is a heavy steam engine oil thinned down with kerosene. It should be thinned down to the consistency of a medium cylinder oil.

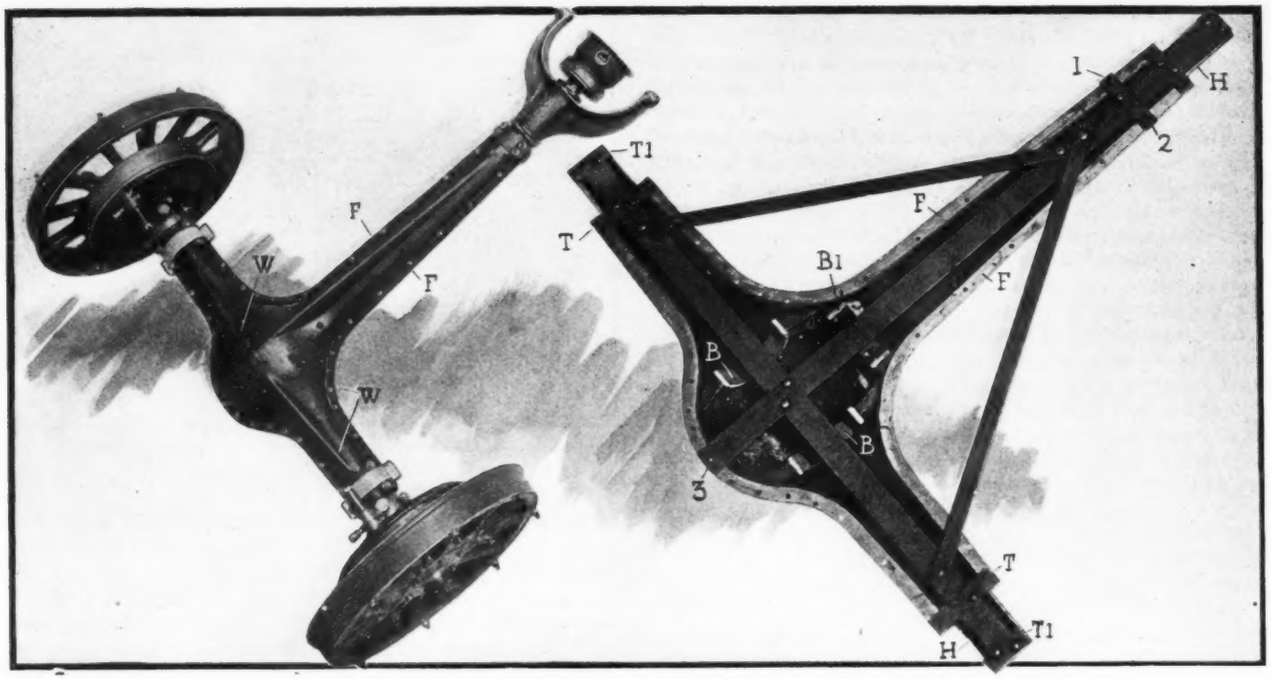

Fig. 1—Fiat pressed steel rear axle and combined torque tube.

Fig. 2—Template used in cutting barrel ends of stamping to size

Fiat Rear Axle and Torque Tube a Unit

Factory Processes in Construction and Assembly of Combined Rear Axle and Torque Tube Stampings

Accurate Testing and Gauging Are Important Features of Company's Manufacturing Methods

THE last 3 years have witnessed general advances in rear axle construction. Interwoven with these advances has been the development of novelties, some with special merits, but often these offset by hidden disadvantages. The Fiat pressed steel rear axle and combined torque tube for the propeller shaft while unique in America has a following in Europe which is gaining. It has the complete housing made from two stampings made in the Turin factory of this concern. One stamping forms the top half, the other the bottom half, a series of cold-rolled steel bolts uniting the two. These stampings weigh in the rough 41 pounds each, giving the total housing weight little above the 80-pound mark, a fact which the factory can proudly boast of in these days when all Europe is aiming at reducing the unsprung weight of the rear axle. Not a few other European makers are cutting down unsprung weight. De Dion being a leader in that he uses the combination stationary and live axle, the stationary or unsprung part being but a forging extending from wheel to wheel whereas the differential and the drive shafts from it to the rear wheels are supported on the chassis frame, thus being carried through the springs and not coming under the classification of unsprung weight.

Each half of the Fiat rear system housing is stamped from a sheet of 50-point carbon manganese steel 4 millimeters, or approximately 1-6 inch in thickness. The utmost accuracy has to be maintained in the manufacture of these housings and the illustrations herewith show in a general way some of these processes. In making a rear axle quietness is the great aim, and quietness means proper meshing of the driving pinion with the differential bevel. The Fiat company has constructed this axle housing along the line of getting this meshing correct in the factory and not making any provisions for disturbing it by the car owner or the casual garageman; in a word, it is a non-adjustable axle with the axle drive shafts not withdrawable.

To get the desired accuracy in the housing and the mounting of the differential and pinion it is necessary to treat each stamping with the utmost care. First in this comes the preparations of the flanges F, Fig. 2, where the halves bolt together. These flanges, to reach the desired degree of accuracy, are gone all over with a hand file, are then finished with emery cloth and finally shellacked, thereby eliminating the use of a gasket and yet giving an oil-tight joint. This necessary accuracy of the flange faces is tested on a huge metal surface plate, not illustrated.

After accuracy in these flanges has been obtained it is necessary that the halves be rigidly held together, which is done by 5-16-inch cold-rolled steel bolts placed 4.5 inches apart on the straight portions of the housing and much closer at the four curved portions in the proximity of the differential expansion.

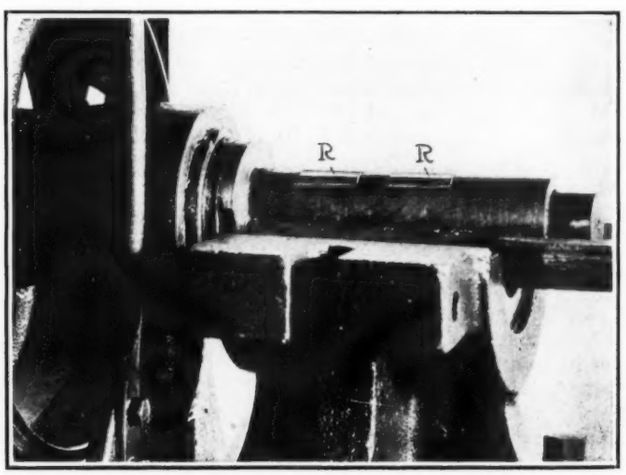

Fig. 3—Detail of hub truing operation

where the strains of the differential and driving pinion are set up. Further strengthening of the expansion is by the heavy webbing W, Fig. 1.

But the preparation of the flanges is only one part of the work on these stampings. They must be of correct measurement which is accomplished by templet, Fig. 2, which serves several purposes. Its iron cross-piece carries a part T which determines the exact length of the flange, and another part, T1, fixes the length of the further extension of the flange in the form of a hub. A similar cross-piece fixes the length of the flange at the forward end of that portion of the housing constituting the torque tube, and another determines the length of the tube. The templet has three anchor points designated respectively 1, 2 and 3 which are the fixed layout marks for the housing.

After the stamping has been cut to the correct size the three ends or hub portions have each to be brought to perfect semi-cylinder in order to mount them accurately in the brake drum carriers. This work is done by a special machine, Fig. 5, in which three truing hubs H1 fit and are revolved. The exact nature of these hubs is better shown in Fig. 3, in which it will be seen that a series of short rollers R carried in slots with provisions within the sleeve carrying these rollers to force them out radially as desired. The operation of the truing up of these three hubs consumes 20 to 30 minutes. When the operation is in progress caps K, Fig. 5, are fitted over the expanding parts, these being removed in the illustration for clearness. This done there is the necessary trimming of the flange edges, which is a minor operation.

Truing of Hub Ends

After this expansion of the hub ends a test gauge, Fig. 6, is placed in each half of the axle and the portions of this test gauge fitting within the hub ends is painted with a color preparation to ascertain if the hub portion completely coincides with the curvature of the gauge.

The next major work in this axle construction is that of mounting and preparing the three brackets B and B1, Fig. 2, on which the differential and driving pinion are mounted. These brackets are steel castings riveted to the stampings. Once in place they have to be accurately prepared for the bearings. These brackets B are first bored one-half at a time. The bracket B1 is similarly bored, the boring fixture being secured at the forward end of the torque tube in order to insure the desired accuracy. In addition to boring the bracket B1 is hand reamed, Fig. 4 showing the hand reamer R in place together with the fixture J with its two bosses of exact size of the bearings carrying the differential and resting on the brackets B. The reaming shaft is anchored at R1, the forward end of the torque tube to gain the greatest accuracy. When this hand reaming is taking place both valves of the stamping are bolted together, the upper one having been removed in the illustration in order to show the reamer.

Special fixtures are used on the boring machines to insure accuracy of the brackets B.

Many of the internal details of the Fiat axle cannot be obtained from photographic reproductions, but appear in Fig. 7. The drive shafts S support the rear wheel on a slight camber of 1 per cent., to be more explicit 1 millimeter camber to every 100 millimeters of drive-shaft length. The road wheels are fitted to a taper with key and at the inner ends the differential bevels are similarly fitted. The inner end of each shaft takes a hardened piece P which is sunk into the end of the shaft and pinned. The oppos-

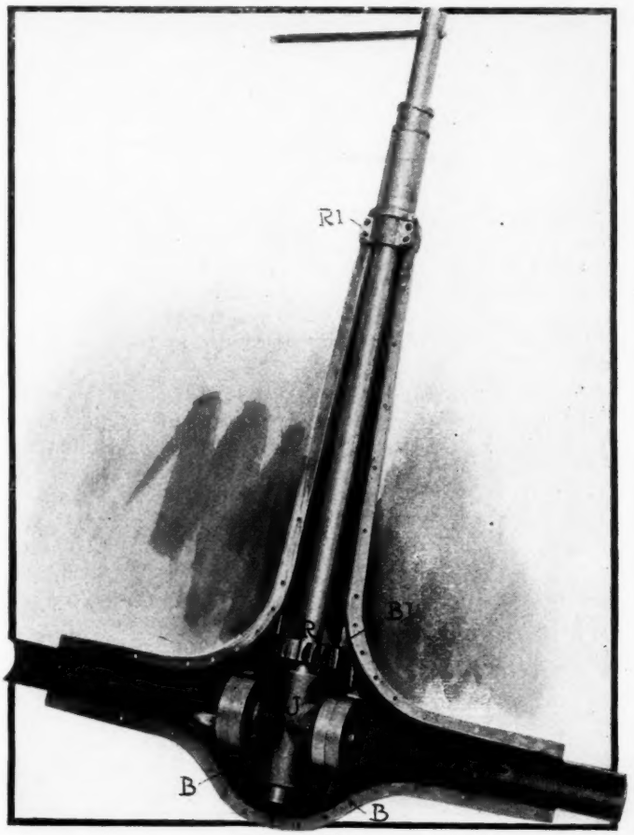

Fig. 4—Showing method of hand-reaming of pinion bearing in Fiat rear axle. During this operation both stampings are firmly bolted together

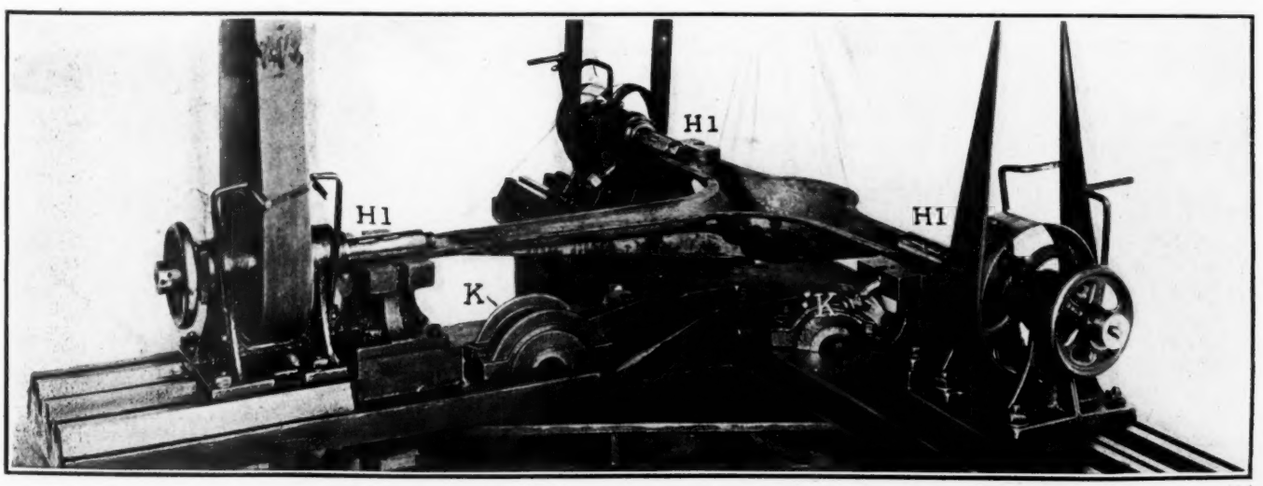

Fig. 5—Machine used for simultaneous truing of all three barrel ends of Fiat rear axle stampings

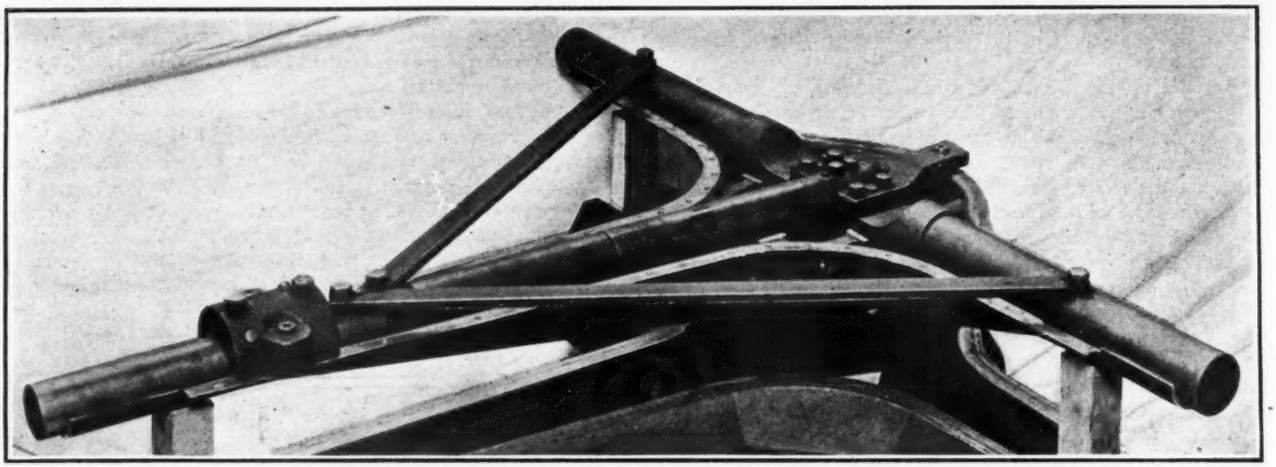

Fig. 6—Combined T square gauge and drilling jig for Flat rear axle

ing faces of these pieces bear together constituting a thrust bearing. In addition to this there are three other thrust bearings, one at each side of the differential and one in advance of the pinion. Four R. I. V. annular bearings are used to carry the differential and axle shafts and a double race of these bearings supports the pinion fitted to the rear end of the propeller shaft. The forward end of the propeller has plain bearing at the point Y. The fork or yoke X supporting the torque tube has the axis X1 in line with the axis of the universal joint thereby giving the desired action.

The rear brakes, as shown in the inset Fig. 7, are of large diameter, giving great braking power. They are double-acting, with expanding shoes A and contracting shoes B.

Harking Back a Decade

FROM *The Automobile and Motor Review*, December 13, 1902:

A project is being seriously advanced to connect New Jersey with New York and the north Atlantic coast by a macadamized highway across the Newark meadows. New Jersey has from 1,200 to 1,500 miles of finely improved roads but it is exceedingly difficult to reach them from New York. Flat steel rails will be laid in Murray street on the Manhattan side and it is expected that the new road will extend from Marion on the Hackensack river to Harrison on the Passaic cutting between the Lackawanna and Erie tracks.

The first Peugeot coupé imported into the United States has attracted a lot of attention recently on the streets of New York. The car has a two-cylinder motor, carried beneath the body in the rear. Ignition is by hot tubes. Its speed is from 4 to 25 miles an hour.

Henry F. Donaldson, editor of *The Automobile and Motor Review* has gone to Paris to report the automobile show and later will make a tour of inspection covering various large continental factories.

The question of licensing automobilists is agitating the national organizations. The A. C. A. recently went on record as favoring a state license; the N. A. A. M. wants federal license. The A. A. A. and A. M. L. have taken no definite position on the matter to date. Conditions are becoming intolerable through the passage of laws and ordinances in various localities without definite standard, making it a misdemeanor to operate an automobile in a certain way in one town and perfectly legal to use the same methods in the adjoining village.

The A. A. A. has declined to receive and sanction the records made at Detroit last month by Barney Oldfield in the Ford racer. This leaves the record for the flying mile on a circular track to the former holder, Alexander Winton. The Oldfield trials were timed with stop watches held by Dr. R. C. Rudy, William E. Metzger, E. H. Broadwell and J. M. Colquhoun.

Exports of automobiles and parts from New York during October reached a valuation of $122,624. For the first 10 months of the calendar year they were $970,610. This showing compares with $55,735 and $262,537 during the corresponding periods of 1901.

Warrant for the arrest of E. J. Pennington, who has cut a wide swath in the automobile and airship field in the United States and England, has been issued at the request of a Cincinnati hotel where he stayed this fall. Pennington is said to have sold his airship patents to Great Britain for $5,000,000 a short time ago but that his activities in buying automobile factories exhausted his capital.

German Daimler cars are being duplicated by the Daimler Manufacturing Company, of Long Island City, L. I., and will be placed on the market shortly. One 12-horsepower car, an exact facsimile of the foreign built model, has been turned out.

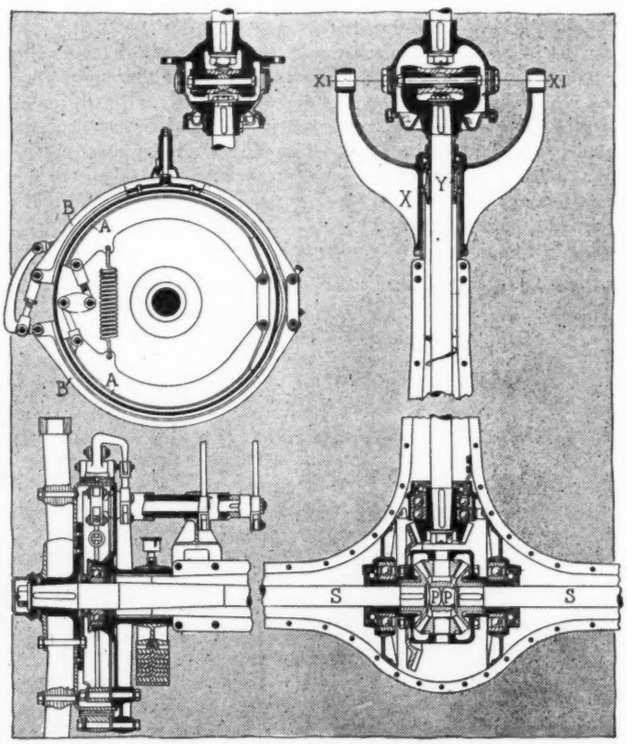

Fig. 7—Section showing construction of Flat rear axle and brake mechanism

Communications from The Manufacturer

H. H. Franklin on Annual Models—P. W. Litchfield on the Breaker Strip —Owners and the Care of Rims

SYRACUSE, N. Y.—Editor THE AUTOMOBILE:—The editorial in your issue of November 21, entitled The Annual Model, was about the weakest statement I ever saw on the subject. You attempt to show conclusively that the American automobile is not sufficiently developed to warrant the elimination of the annual model.

The development of a car, namely, its degree of perfection, has nothing whatever to do with the annual model question. You also say that so long as automobile shows are held it will be necessary to have the annual model.

You must have written the editorial to please the annual modelers. Or else you are in possession of a fine large fund of ignorance on the subject.

Improvements can be, should be and are made in automobiles regardless of annual models.

Just when improvements are made is usually a question of the manufacturer's stock, both raw and made up. This is sometimes offset by the character of the improvement required. If it is something that must be taken care of to preserve the car's quality and the manufacturer's standing, it will be done at the earliest practical moment no matter what the loss in stock on hand. The improvement demanded may be something to overcome weakness in design or material, or both.

When the front door bodies appeared some makers attempted to go through the season without that type of body. They had announced their annual model, but they got the front door on as soon as they could. They did not wait for another annual model announcement time.

Right now makers who announced their 1913 models without starter are moving heaven and earth to get starters on. They would be in a fine fix if they waited until the 1914 model was ready. Some who announced starters are already changing to other types, and so it goes.

You will find that the makers who have abandoned the annual model plan will be at the shows this winter with right up-to-the-minute product. They are likely to be more up-to-the-minute than the annual modelers, because their manufacturing plans are worked out on a more flexible basis. They can make improvements easier and with less expense. They are really in position all the time to take advantage of today's advancements.—H. H. FRANKLIN, H. H. Franklin Manufacturing Company.

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AKRON, O.—Editor THE AUTOMOBILE—There are still occasional tire users who do not fully understand the function and purpose of the breaker strip, which lies along the tread of the Goodyear automobile tire, concealed by the tough rubber of the tread. The explanations occasionally given for the presence of the breaker strip are entertaining, to say the least.

The breaker strip is put in a tire to take the shocks which obstructions in the road are liable to give to a tire, before they can reach the organic part of the tire. It plays no part in the strength or efficiency of the casing, but is simply an armor belt around the outside of the tire to protect it from injury.

The body of the tire, to give the best results, is made of fairly close-woven fabric placed at an angle of 45 degrees. The tread rubber, to give the best wearing qualities, is made thick and tough, and while in service exerts a drag on the fabric, tending to pull it loose. The breaker strip should be put in with the treads running around the circumference of the tire, instead of at an angle of 45 degrees, as this more effectively takes up the shocks without transferring them to the carcass and better resists the drag on the rubber, pulling it away from the tire fabric.

When sharp stones or glass cut the tread rubber, in many cases the abrasion is stopped at the breaker strip, preventing the water and dirt getting down to the main fabric, thereby preventing the tire being water soaked or sand blistered to quite an extent. As the breaker strip is the nearest fabric to the road, it receives all the cuts, water, dirt and sand, and should be made, so far as possible, to resist damage caused by them. For this reason we wish an open fabric which can be more effectively united to the rubber. On the other hand, we wish a closely twisted yarn, tightly woven, to avoid becoming spongy when water soaked, thereby letting go from the rubber. We believe that our rivet fabric is the best compromise between these two qualities, as it is made from closely twisted yarn, tightly woven, to make it as waterproof as possible, but leaving large holes at intervals through it, which result in the formation of large rivets of rubber, making a fabric which is more closely united to the rubber than any ordinary loose-woven fabric, and at the same time it is more waterproof after the tread has been cut.

Always bear in mind when you have breaker strip trouble that undoubtedly this has saved the tire from much more serious injury at a much more vital point in its construction. To obtain the best results from breaker strips there should be a cushion of rubber between the breaker strip and the main fabric of the tire.—P. W. LITCHFIELD, Goodyear Tire and Rubber Company.

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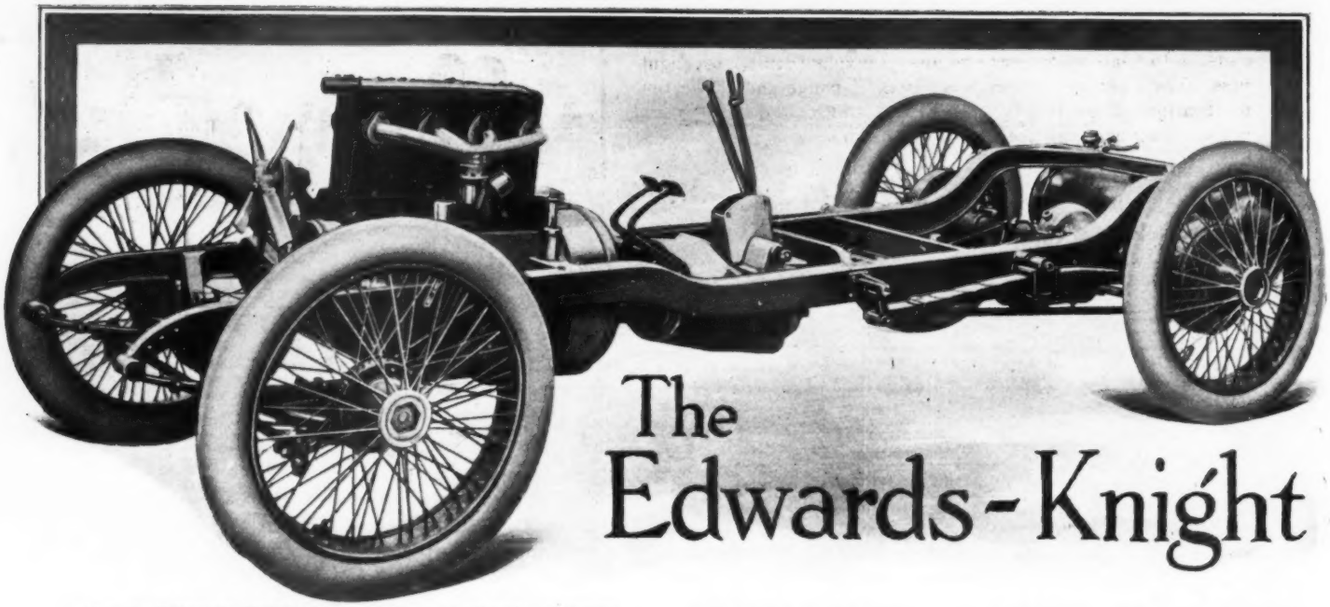
CLEVELAND, O.—Editor THE AUTOMOBILE—Of all the component parts of the automobile, perhaps the most widely discussed by the press and by users is the motor, and those parts which receive least consideration, if any at all, are the rims on which the tires are mounted. Although rims are operating mechanical devices, they are seldom looked upon as such by the car owner, even though he may be thoroughly familiar with every other mechanical feature of his machine. And yet there is no part of the automobile which receives more severe service.

Often, when a blow-out or puncture takes places on the road, your car owner will be confronted with an entirely new problem—he will not know how to go about removing the tire from the rim. If his car is fitted with demountable rims he is a lucky man, for in that case he can put on the spare tire without much trouble. But let him try to get the tire off the rim and he will begin to find cause for complaint in the rim. Yet if the rim had been investigated and its construction understood the operations connected with its removal would have been simple.

Rim makers of today have given as much thought to their product as have the manufacturers of any other product, and perfection along this line is as nearly attained as elsewhere. Tire replacement is not the burden now which it was in the past, but the new devices must be understood for their extreme simplicity to be apparent. Not that they are complicated by any means, but there are certain special operations connected with their use with which every car owner should familiarize himself.—Standard Welding Company.

—

NEW ORLEANS, LA., Dec. 6—In the French quarter, laid out nearly 200 years ago, there has been great difficulty in handling the traffic, owing to the narrowness of the streets. In the last report of the chief of police, he states that, due to the increased number of motor vehicles it is now possible to reduce the traffic squad materially in the old part of the city. When horses were used altogether, the lives of pedestrians often were endangered by the animals becoming unruly in the jam at street intersections. Motor vehicles have radically changed conditions.



The Edwards-Knight

Fig. 1—Edwards-Knight 25.6 horsepower chassis, showing double dropped frame and Lanchester spring

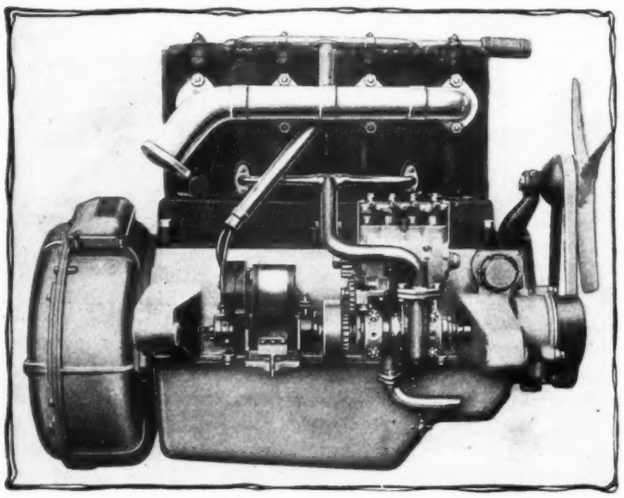


Fig. 2—Exhaust side of the new motor, showing disposition of chain-driven magneto and pump

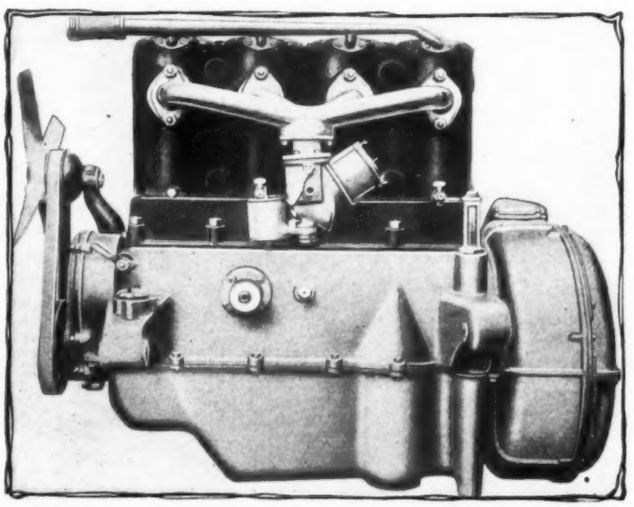


Fig. 3—Intake side of the Edwards-Knight. The flywheel housing at the right contains an electrical self-starter

Notable Features of New Car Include Electrical Flywheel Starter — Unit Clutch and Gearset—Worm Drive

THE Edwards-Knight is out. This latest addition to the list of American-made cars was originally announced last February when C. G. Stoddard and H. J. Edwards withdrew from the United States Motors and immediately launched the Edwards Motor Car Company, of New York City. At that time announcement was also made that Messrs. Stoddard and Edwards had secured from Knight & Kilbourne the last American license to build automobiles under Knight patents, that is, using two sleeves in place of poppet valves.

The Edwards-Knight is a specially-designed automobile. To summarize, it is a 25.6-horsepower, four-cylinder type, with 4-inch bore and 5.5-inch stroke; the motor uses silent chain drive for the eccentric and magneto shaft; it has force-feed non-splash lubrication; it has an electric self-starter incorporated within the inclosed flywheel; the dry-disk clutch is carried in a separate compartment in the forward part of the gearbox; the gearbox is flexibly supported and has four forward speeds; worm drive is used in the rear axle, with the worm beneath the axle yet affording a 9.25-inch clearance; detachable wire wheels with Q. D. rims are used; the steering wheel is on the left side with center levers; Lanchester patent springs are used in the rear, and the frame is double dropped.

The chassis embodying these features is made with 120-inch wheelbase and takes two-passenger roadster, four-passenger torpedo, five-passenger touring car, seven-passenger limousine and seven-passenger landaulet bodies. Prices are $3,500 to $4,700.

The present chassis model 25 possesses new features in torque and radius rod design as well as universal joint action in the propeller shaft.

The motor incorporates all of the 1913 improvements that the European licensees have made in the Knight type, including long-stroke, namely, a stroke-bore ratio of 1.35 to 1; longer stroke of the sleeves; making both inner and outer sleeves the same thickness, and change of timing to give a maximum opening of the ports on both intake and exhaust strokes.

The twin cylinder castings are imported, as are the cast-iron sleeves and pistons. Water pump, Simms magneto and tire pump are grouped on the right side, all driven through a longitudinal lay shaft; on the left are the S. U. carbureter and the air pump for gasoline pressure, leaving this side clean for the steering column.

The motor uses a five-bearing crankshaft 2.25 inches in diameter. It has all main bearings and crankpins drilled for lightness. The flywheel anchors to an integral flange and at the center bearing are two flanges F, Fig. 4, which care for the end thrust. The bearings are bronze lined with .03125 inch of babbitt.

Connecting-rods are tubular forgings of round section, drilled out to reduce weight and leaving a wall thickness of .125 inch which is increased to .15625 inch at one-third the height of the rod, which is the point of greatest strain.

Pistons with concaved heads carry three eccentric rings above the wristpin and are relieved from the lower ring to the wristpin to facilitate lubrication. The skirt is perforated. An allowance of .012 inch is made at the top and .0035 at the piston base.

The wristpin is a hardened and ground steel tube working in a steel bushing, the bushing being hardened, ground and lapped.

The silent chains used to drive the eccentric and lay shafts are non-adjustable. The drive to the eccentric runs on pulleys with 6.676-inch centers and that to the magneto with 8.8225-inch centers. Both are broad and of 6 pitch. Lubrication is through the forward end of the drilled crankshaft and out through radial holes, 1, 2 and 3, Fig. 6, and thence by centrifugal force outward through holes in the pulley into the chain.

The operation of the Knight sleeves is well understood. Here they have a reciprocation of 30 millimeters, or 1.18 inch, which is longer than previously used and results in longer intake and exhaust openings. The intake ports are on the left side, the exhausts on the right, and both have a circumferential length on the sleeves of 3.5 inches. The intakes are 12 millimeters, .472 inch high, the exhausts 18 millimeters, or .70 inch. In other words, the intake port is equivalent to 1.645 square inches opening and the exhaust to 2.45 square inches.

The intake opens 15 degrees late and closes 36 degrees late, giving it an opening of 210 degrees. The exhaust opens 55 degrees early and closes 5 degrees late, a total opening period of 240 degrees. With this motor the power efficiency is not only due to the area of the port or valve openings, but also to the length of time they remain open as well as to the rapid opening and closing. This is graphically shown in the timing chart, Fig. 10.

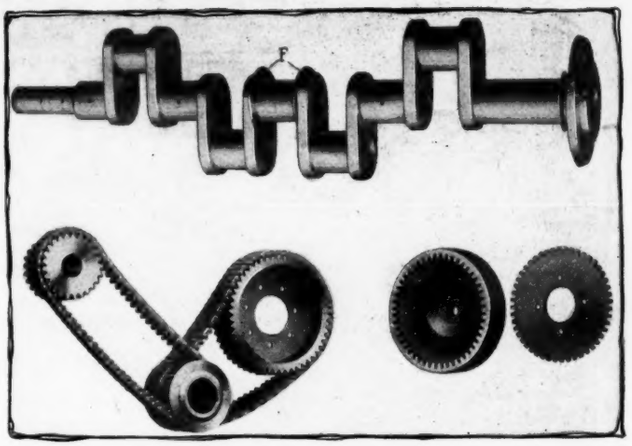


Fig. 4—Top view shows hollow crankshaft with integral flanges at the center main bearing to take end thrust. Below, arrangement of silent chain drive for eccentric and magneto shafts

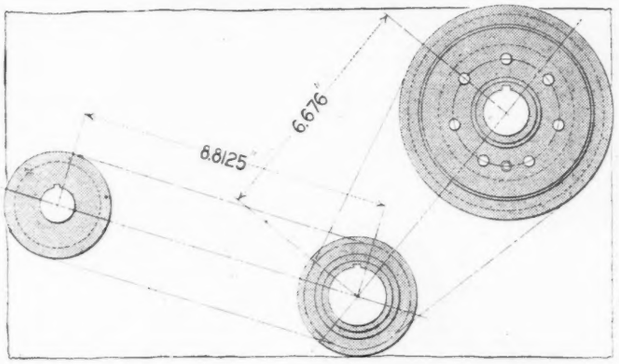


Fig. 5—Relative position and sizes to scale of magneto and eccentric shaft chain drive

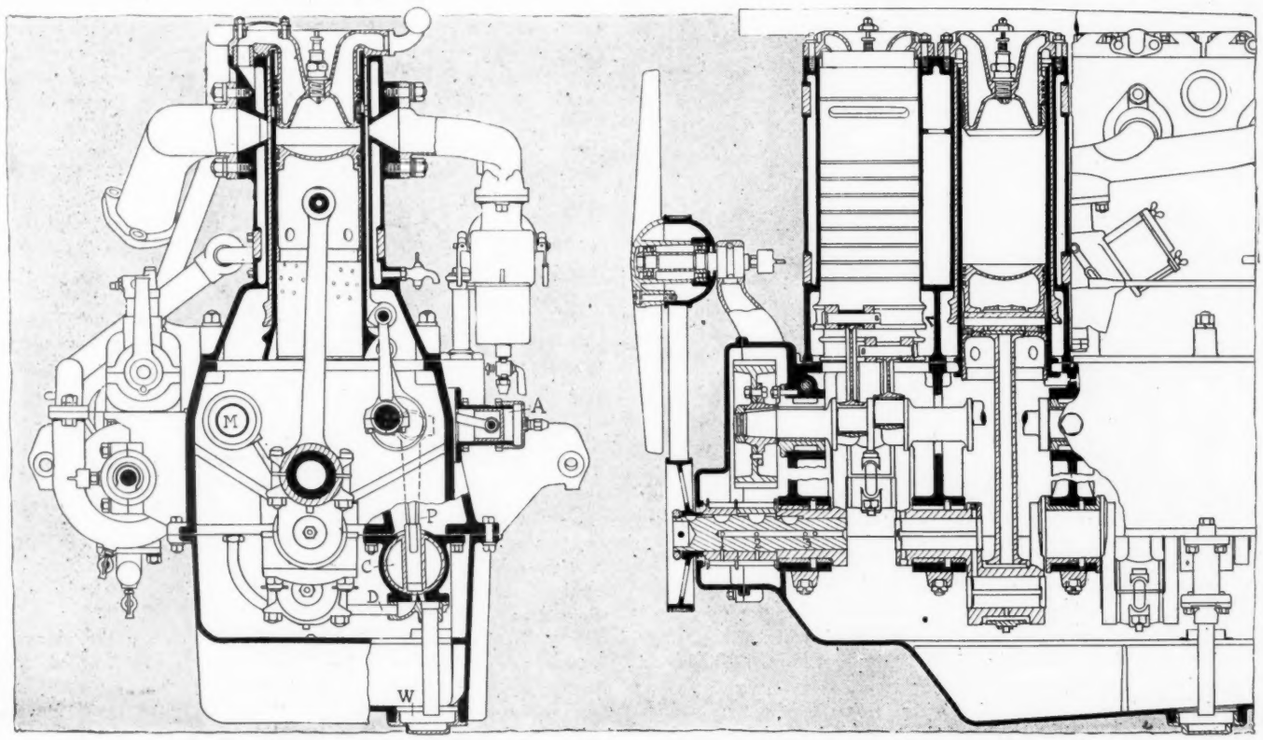


Fig. 6—Cross-section and partial longitudinal section of the Edwards-Knight 25.6 horsepower motor

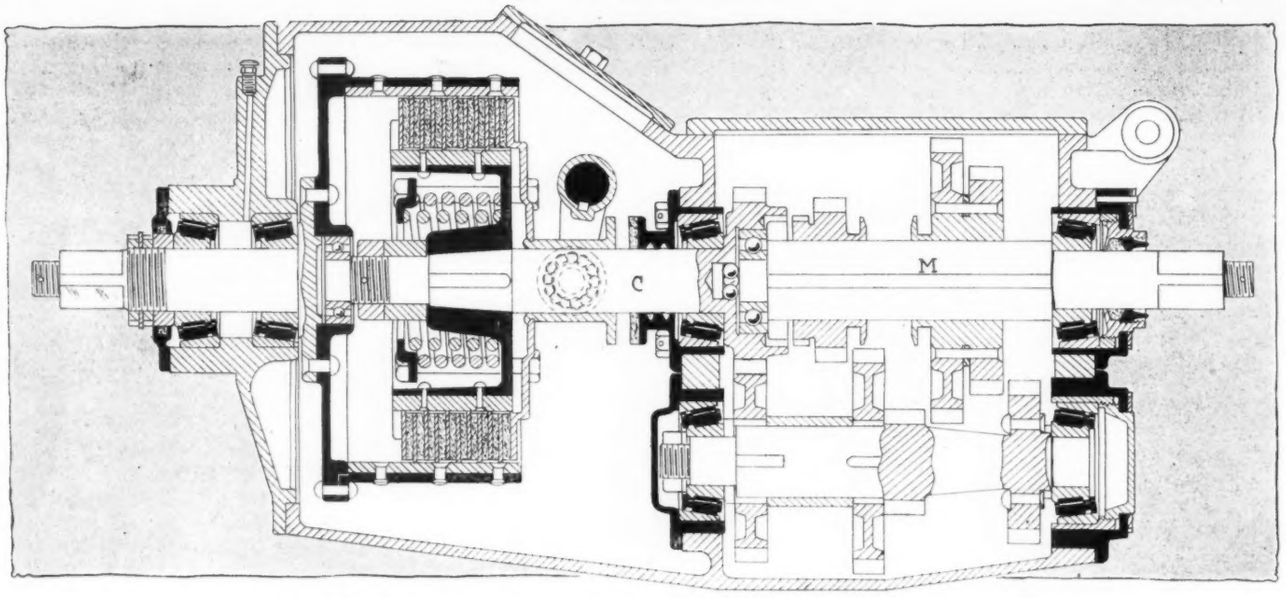


Fig. 7—Combined dry-disk clutch and gearset. Note oiltight dividing wall and use of roller bearings

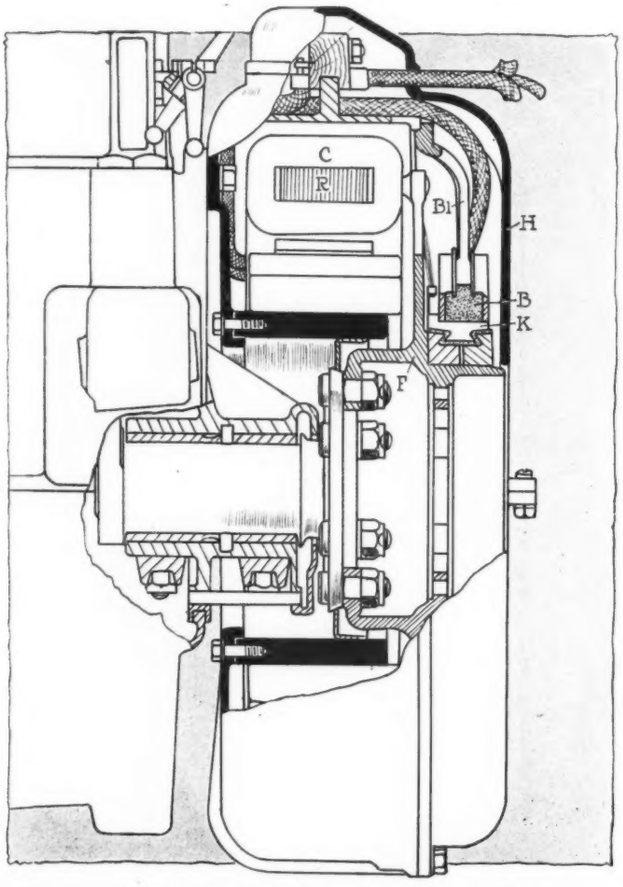


Fig. 8—Sectional view of electrical self-starter attached to rear end of crankshaft

The intake opening chart is practically a 45-degree opening line and also closing line; and in the exhaust valve the opening is quicker and there is a considerable period when the port remains at maximum opening, this being represented by the flat top of the diagram.

This quicker opening and closing is due to the two reciprocating sleeves which are so timed that in intake opening the inner sleeve moves up and the outer sleeve down. The inner sleeve beginning its acceleration and the outer sleeve at its maximum speed of travel. To close the intake the inner sleeve alone moves upwards at maximum travel against the junk ring in the cylinder head, which gives the gas sealing necessary. The exhaust ports are opened by the inner sleeve lowering at maximum speed from the junk ring and are closed by the outer sleeve on its downward motion.

Lubrication is an improved non-splash pressure system without any auxiliary feeds to cylinder heads or sleeves. A single-plunger oil pump located within the crankcase base supplies lubricant at a pressure varying from 2 to 20 pounds according to the demands. The plunger P, Fig. 6, operates direct from the eccentric shaft and works in an oscillating cylinder C, whose oscillations are so timed that its bore registers with the intake pipe from the oil well W on the upstroke of the plunger and with the discharge pipe opening D on the down-stroke. The discharge pipe connects with a large conduit M incorporated in the crankcase when cast, and which conduit has distributing branches to all five of the crankshaft bearings; thence, through the drilled crankshaft and the hollow connecting-rods and hollow wristpins, the positive oil pressure of the pump reaches all of the important motor bearings, etc. The motorbase has an oil capacity of 2.5 gallons.

Stock equipment includes an electric self-starter of the U. S. Light & Heating Company type incorporated within the flywheel and weighing approximately 100 pounds extra and being entirely within the housing containing the flywheel. Fig. 11 shows the housing H and the rotating portion of the starter R. These parts are also shown in the sectional drawing Fig. 8. The rotor R is mounted on a spider F and carries a series of coils C. The commutator K is fixed on the hub portion of the spider, the brushes B being supported though arms B1. To start, current is drawn from a battery and once started the battery is recharged from the starter which assumes the rôle of a generator. The starter control is in a small lever on the dash.

The magneto timing can be adjusted by changing the mesh of the gears. Closely associated with the ignition system is that of the four-cylinder power tire pump driven by gear from the pump shaft. The tire pump is snugly nested above and back of the water pump.

The S. U. carbureter is an English production the manufacture of which in America has been secured by the Edwards company, and its cardinal characteristic is that the area of the air space surrounding the nozzle is automatically varied by the motor suction acting on a bellows which in turn controls a piston. This piston obstructs the air passage. With high motor

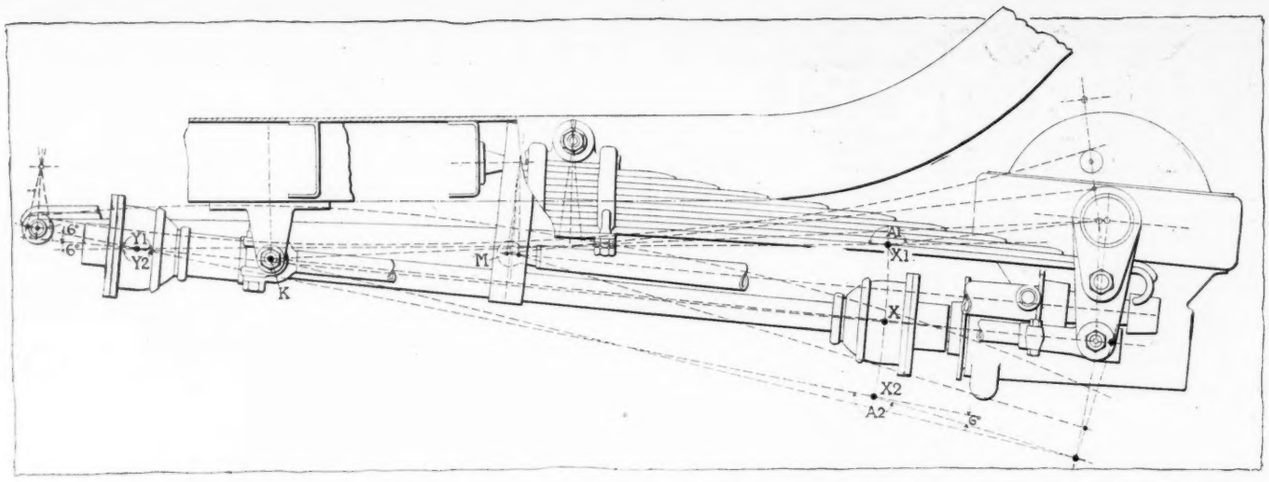


Fig. 9—Diagram explaining the action of the torque rod and distance rods which is such that no sliding takes place in the universal joints of the propellershaft

speeds the piston is drawn out of the passage, increasing its area and thereby lessening the suction on the gasoline in the nozzle and giving that desired reduction of richness in the mixture, whereas with low motor speeds this governing piston largely obstructs the air passage thereby increasing the suction pull on the gasoline in the nozzle and giving a richer mixture. The governing bellows is contained within the cylindrical part of the housing, Fig. 3, which is mounted at approximately 45 degrees. The vertical cylindrical chamber contains the float. Air pressure for the feed is through a simple plunger pump A, Fig. 6, driven from the eccentric shaft.

The combined gearset and clutch is shown in Fig. 7, the clutch a dry-disk type with its steel disks faced with asbestos and all contained within a separate compartment and supported in front on a double race of Timken rollers and in the rear by a single race. The clutch shaft is carried within the recessed end of the crankshaft in a ball bearing and it is formed with an integral gear on its rear end within the gearbox proper and supports the mainshaft M on an annular ball bearing and carries also a ball end thrust. The remainder of the bearings of the set are Timken rollers, the short-series type, oiltight bearing plates and packing are used. Nickel steel is used throughout for gears and shafts. There are four forward speeds with direct on third. The gearbox is flexibly mounted on two frame cross-members, in front through a trunnion and through two points at the rear where a fore-and-aft hinge motion is afforded.

The Edwards-Knight has a straight-line drive in that the motor is mounted to decline slightly to the rear, to be accurate, the angle is 4 degrees; and the gearbox is similarly declined so that with the car loaded the crankshaft, the mainshaft of the gearbox, the propeller shaft and the worm shaft in the axle are all in a straight line.

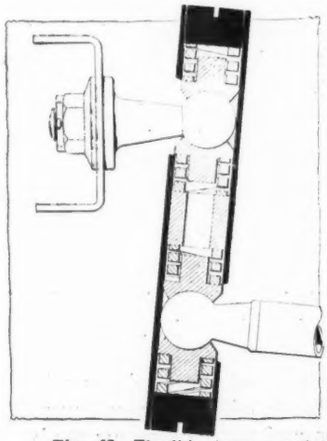


Fig. 12—Flexible torque rod fastening

To understand the merits of the propellershaft system it must be remembered that a torque rod and two distance rods are used that the length of these is such that they work in unison and eliminate all sliding movement in the universal joints. The angles in the front and rear universal joints are the same at all times, namely, the angle between the gearshaft and the propellershaft in the front joint equals the angle between the propellershaft and the wormshaft in the rear joint, a fact which neutralizes the acceleration and retardation which take place twice during each revolution in a universal joint. Fig. 9 will aid in explaining this: The arc Z contains three indicated point, X, X1 and X2, which represent the rear universal joint at three positions, normal in the center,

(*Continued on page* 1234.)

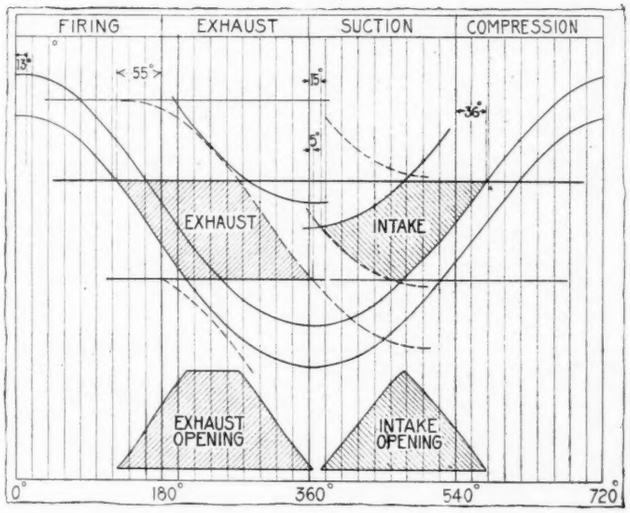


Fig. 10—Valve timing chart of Edwards-Knight motor

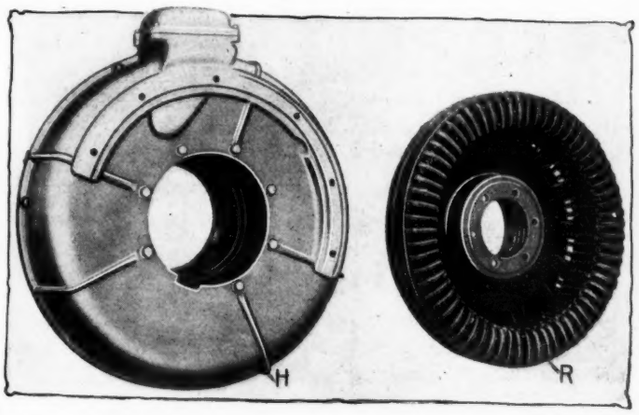


Fig. 11—Outer casing and inner rotating member of dynamo-starter

The Automobile

Vol. XXVII Thursday, December 12, 1912 No. 24

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Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Announcement

BEGINNING next week THE AUTOMOBILE *will start the publication of a series of articles entitled Criticisms of Non-Poppet Valves To-Date, by Eugene P. Batzell. These articles will appear from week to week in relatively short instalments so that the busy man of the day and the onslaught of holiday activity will not make the following of them from week to week, a difficulty with any reader.*

In his treatise on the subject Mr. Batzell, who has approached the subject from the viewpoint of the practical engineer, takes up seriatim the many types of non-poppets that have been invented and brought into the practical stage to one extent or another. He points out the various shortcomings of many of the types as shown in practice and analyzes the inherent weaknesses of others that in some cases have progressed little beyond the patent office stage.

The able manner in which Mr. Batzell deals with any subject he undertakes to write upon is well known through his papers presented before the Society of Automobile Engineers, which have invariably shown keen engineering judgment coupled with a wide knowldge of modern practice. In Criticisms of Non-Poppet Valves To-Date he has accommodated his language to the intelligent car owner, to the intelligent dealer as well as combining in his sentences many new thoughts on the situation which cannot but stimulate activities among the engineering fraternity of today.

Fewer Models—More Cars

Foreigners Imitate Americans

ALL manufacturers must come to the rational order of things or die a premature death. This is most apparent to-day in the phenomenal change that has swept over the makers in the question of multiplicity of models. The time was when one concern boasted that it had twenty-one different models for a certain year. Each model had its characteristics and while the company had not twenty-one different motors it had over half that number of different cylinder dimensions, wheelbases, angles to steering columns, wheel sizes and other specifications. It deemed that such a scale of models was necessary in order to meet the requirements of the fastidious public.

To-day this is changing and changing rapidly. Business competition is working the change. Companies with seven different models in 1912 are cutting them to three for 1913 and some extremists have dropped from a variety program of six to a single one for the ensuing year. All through the list of car manufacturers, where there has been a needless multiplicty of models there has been a pruning for next season.

Some makers have ben inexcusably slow in discovering the amount of factory disorganization occasioned by so many models. Only with the present reduction in prices, made possible in many cases by increased production and elimination of models, have they realized the losses due to upsetting the factory every few days or weeks in order to run through a line of parts for the various models. They have at last weighed the situation and discovered the loss of time in actual machine operation and coupled with which is the lack of workman capacity for a period after each change is made.

Our biggest producers have naturally been the first to act on the model-reduction program. Output has made it imperative with them, and frequently it was essential with them to have output in order to meet the listed price of rivals. But one of our big holding companies has gone still further in this centralizing program and instead of cutting out models of the same make has been gradually reducing the number of subsidiary factories, dropping one here and another there and, as each is disposed of, centralizing on the others and multiplying their annual product. The dollar-and-cent value of this good judgment cannot be overestimated. It facilitates work all through the factory gamut.

In this respect the German engineer must be credited with going perhaps a little further than his rivals in that he has been busied in research work for several years in which he aims not only at reduced cost of output but at putting a little better workmanship and a little better design and a little better material into his car. The laboratories of Germany have been activity-centers for the last few years. Much of the research information has been kept private or issued at the end of each year in booklet form. Even in these the usual German brevity in matters technical is apparent, and the engineer who would follow closely the research of the German must read closely between the lines and put continuous study into his work.

Indianapolis and Detroit Sections of S. A. E. Meet

E. B. Van Wagner in Paper on Metallurgy of Motor Bearings Recommends S.A.E. Standard Babbitt—Discussion on Swiss Slide Valve Motor

INDIANAPOLIS, IND., Dec. 6—The November meeting of the Indiana branch of the Society of Automobile Engineers having been postponed on account of Thanksgiving, it was held Thursday night, December 5, at the regular meeting place—the Hoosier Motor Club rooms in this city.

The subject under discussion was the Metallurgy of Gasoline Motor Bearings, the speakers of the evening being Mr. Van Wagner, of the Van Wagner Die Casting Company, Syracuse, N. Y. The chief points of interest in the talk embraced the following:

At the present time there are three classes of bearings in use on gasoline motors—the ball roller and anti-friction metallic bearings. With the exception of the Chalmers and the Lozier, which use ball bearings, practically all automobile manufacturers in this country use anti-friction bearings either in the form of die castings or as sand cast alloys.

The design of motor bearings is interesting and not understood by the average layman. A feature developed with one manufacturer of high-speed motors in that the use of different bearing materials influenced the speed obtainable from the motor. The design of bearing naturally resolves itself into the question of length and diameter, which should be as small as possible in accordance with the pressure and work expected from it.

Best Alloy Depends on Shaft Material

There are four main points to be considered in the selection of a bearing for any special position, namely, the dimensions; selection of the proper material; the anchoring and the clearance between bearing and shaft.

In the anti-friction bearings there are two kinds being used. The anti-friction white metal and the bronze bearings. The anti-friction bearings are commonly the white brass ones backed by a bronze backing. The advantage of having this soft plastic metal next to the shaft lies in its capacity to shape itself to the shape of the shaft and more nearly form a perfect surface than in the case of the bronze where hard spots are likely to develop.

The selection of the material of the alloy used depends upon the shaft material; the temperature developed; the friction and pressure and the cost.

The lubrication of bearings is a very important feature in the determination of the alloy used. Soft white brass compositions have a quality of self-lubrication—a decided advantage over the bronze.

As to the cost of the two materials, notwithstanding the fact that the ingredients of the white brass are more expensive than the bronze, the fact that it is much easier worked brings down the final cost lower than that for bronze.

From experiments, the Society of Automobile Engineers standard of babbitt has been found best—having no tendency to flake—which feature is very noticeable in the majority of the alloy bearing metals.

The last point in the selection of a bearing, namely, the clearance, is an important one. There is a tendency to make the fit too close and not allow space enough for the film of oil.

The following discussions by Howard Marmon, of the Nordyke, Marmon Company, Mr. Wall of the National, and Mr. Wood, of the Indiana Die Casting Company, proved of interest.

Instead of using the customary bearing which consists of the plastic white brass backed by the bronze, why not use the white brass die castings with no backing? This might be satisfactory where the pressure on the bearing was not too great. Is it not a fact that the unequal expansion of the two metals, when submitted to the high temperature which results from high speed, causes this kind of bearing to become loose and the soft part to wear at the ends?

Yes, to a certain extent, but the common practice is to have the bronze backing shorter than the white brass.

The Indiana Die Casting Company is now experimenting on a composition bearing metal to consist of 10 per cent. copper in combination with the other ingredients and discarding the bronze backing. The idea of the bronze backing naturally is to give the bearing strength and resiliency. In answer to a question as to the advisability of using this bronze backing, it was stated that one manufacturer has never used it and found the solid white brass bearings gave excellent service. A second, however, found that when there was any tendency to pound, the white brass bearing would break off at the edges.

The question was raised as to what the result of die casting was with reference to the grain and density of the metal as compared with the ingot. The density of the metal depends upon the casting temperature since this density in turn is influenced by the chilling effect of the die. The grain of the die casting, however, is more open, but harder than the ingot.

The common practice among automobile engineers is to use oil grooves in bearings and to put these grooves on the pressure side.

The question was raised as to the whole subject of bearings; if it is not entirely dependent on lubrication; if, with perfect lubrication—a perfect film of oil—if this would not take the pressure, absorb the friction, etc., but experiments have proven that even with perfect lubrication, when high speed is obtained the bearings undergo a very rapid increase in temperature, even in one case to the point where the connecting-rod ends become blue—all of which points out that the composition of the bearings must contend with this factor even if the lubrication is perfect.

The conclusion to be gathered on the composition of the anti-friction bearings was that the white brass die cast bearings, backed with a resilient metal such as bronze and provided with correctly spaced oil grooves, have so far proven the best.

Record Attendance at Detroit S. A. E.

DETROIT, MICH., Dec. 6—At the regular monthly meeting of the Detroit Section of the Society of Automobile Engineers, last night, at which the record number of sixty-eight was present, a paper by L. B. Brown and descriptive of a new Swiss slide valve motor was presented. It was productive of considerable discussion. Ferdinand Jehle also read a short paper on a new form of magnetic absorption dynamometer.

The new Swiss motor which was brought to this country by Mr. Brown and George Ratcliffe, of London, England, was designed by Martin Fischer, of Zurich, Switzerland. The Motor and Gear Improvement Company has undertaken its promotion in this country, and has it in an imported machine which is also built by Mr. Fischer. This particular engine has been put through some 11,000 miles of hard service and from this experience Messrs. Brown and Ratcliffe stated to the Detroit section of the society that they could give the information obtained by this actual road use of the engine, as well as results of a dynamometer test which was conducted on the Hudson Motor Car Company's testing block.

Want American Exhibits

Russian Show to Be Held in May—Big Field for Exporters—Military Trucks Needed

THE Emperor of Russia will inaugurate the International Automobile Exhibition at St. Petersburg on May , 1913. This project is organized by the Imperial Automobile Club of Russia under the patronage of the Czar and with the backing of the Imperial government. As an event of momentous national import it is being planned on a scale altogether unprecedented in that country.

The president of the Council of Ministers, Mr. Kokoftzeff, has assumed honorary presidency of the exhibition. It is the first exhibition of its kind in Russia to have enlisted direct support from the government authorities and the august patronage of the Czar of Russia.

It certainly is the first exhibition ever held in the Russian empire which avowedly aims to arouse popular interest in the American automobile industry and those allied therewith; in fact, where not only is there marked attention paid to prospective American exhibitors, but where American products are distinctly given official indorsement from the outset.

In his official invitation to the United States Department of State, George Backmeteff, the Russian Ambassador at Washington, expresses himself as follows:

"Considering the fact that the American type of the automobile is indicated for country use in Russia, adapting itself more than the machines of European construction to roads not macadamized, the Automobile Club of Russia is keenly interested in seeing the great American manufacturers of motors and automobiles exhibit their new models at St. Petersburg in the spring of 1913."

Addressing the automobile manufacturers at large Dr. W. Swetchine, aide-de-camp to the Emperor and vice-president of the I. A. C. of R., imparts the following interesting information about Russia:

"Russia was later than other countries to take up the automobile and it is only in the last few years that its use has become general. Our reliability trials of 1910, 1911 and 1912 for the Emperor's prize finally exploded the idea that the Russian roads are unsuitable for automobiles and showed that the country possesses a fine system of excellent highways. These trials also induced the rural population to take an interest in automobiling.

"We are convinced that the American cars should suit the Russian demand as there is a great similarity in the automobiling conditions of the two countries. Our vast grain-producing steppes, peopled with landowners and farmers, dependent altogether on horses for means of locomotion, should prove an excellent market for cars and especially for American cars, as in these districts it is noticed that the light and powerful American cars negotiate the sandy tracks quite satisfactorily when the heavier European car finds difficulty in getting through. Unfortunately, up to the present time, the Russian customer has had little opportunity of judging what a really good American car is as few American firms are represented here. We consider that this is the moment for the American automobile trade to take its just position in the Russian market and our exhibition offers them the means to do this quickly and conveniently. American exhibitors need not bother about the language question, as they will find numbers of Russians talking their language."

Perhaps one of the motives actuating the Russian authorities in evincing such marked and complimentary attention to prospective American exhibitors springs from their desire to dispel any erroneous impressions lodged in the mind of the average American about the alleged hostility of Russia towards this country on account of the abrogation of the treaty of 1831, which came as a result of the widespread agitation from anti-Russian sources. Some anxiety is entertained on this score by the promoters of the exhibition and should the American manufacturers decline to participate in this event it is reasonably certain that their motives will be misconstrued. This may prove disastrous for any prospects of a wholesale export of American cars to Russia.

There is no doubt, however, that the chief factor governing the attitude assumed by the Russians towards the American automobile manufacturer lies in the undoubted superiority of the American-made cars and particularly trucks over the European types, so far as Russian road conditions are concerned, which show a great similarity to those prevailing in this country. English, German, Belgian motors and cars have been developed along essentially different lines. They are a product of ideal road conditions. Some of the makes are superb specimens of engineering skill, but they are, none of them, calculated to withstand the wear and tear imposed by Russian country roads. European trucks are not especially adapted for interurban traffic because countries like England, Belgium and Germany are so

The Edwards-Knight Car

(*Continued from page* 1231.)

highest at X1 and lowest at X2. This arc Z is part of a circle described from the center K, which is the center of support of the forward end of the radius rod so that the line KX1 is a radius of this circle as also are the lines KX and KX2, making them all the same length so that there is not any equalizing of distance and consequently no sliding at the joints.

Further: The angle A1 in the rear joint equals the angle Y1 of the forward joint and similarly the angles A2 and Y2 are equal, a fact which explains the neutralizing of the acceleration and retardation of the joints twice in each revolution.

Radius rods have a ball-and-socket front-end support and ball rear-end support.

The torque rod, a tapered tubing, is doubly flexibly supported in front. Fig. 12 shows the ball-end stud carried in a cross-member of the frame and the similar end on the torque tube. The vertical tube containing them has four coil springs, one above and the other below, so that the utmost universal action is obtained. In action this torque member synchronizes with the propellershaft and radius rods in that the point M is midway between the front and rear universal joints, a fact which aids in preventing joint slippage.

The worm-driven rear axle is a Timken housing with a David Brown straight-type worm mounted underneath the bronze worm wheel. The axle housing is a standard type of Timken stamping with the differential expansion placed horizontally instead of vertically as in the bevel-driven axle. The wormshaft is carried fore and aft on special non-adjustable Timken rollers, their end-thrust merits eliminating other end-thrust bearings. The unit made up of the worm and wormwheel with differential is mounted in a steel casting hung in the under side of the axle stamping. There is a 4 to 1 reduction between worm and wheel. The axle is a floating type, and carries standard internal and external brakes.

The Lanchester rear springs, shown in Figs. 1 and 9, are inverted semi-elliptics supported in their center to the frame through a trunnion, shackled to the frame at their fronts, and carried underneath the axle at their rear, where they are not shackled but bear upon a roller, thus allowing for free back-and-forward motion. The spring is 54 inches long.

In the running gear the double-dropped frame gives a low body, the drop being 3 inches at the dash and 7 inches in advance of the axle. Tires are 36 by 4.5 inches all around.

thickly honeycombed by a network of railways as to obviate all necessity for truck-hauling of goods or passengers. They have never experienced any lack of railroad communication between any two points, wherever conditions would in the least warrant the construction of a railroad. Hence the use of the motor truck has been confined almost exclusively to city delivery service and the motor and truck manufacturing plants have been adapted for production along these lines.

Compared with the American machine, the average European car or truck is encumbered with too many parts and much too delicate adjustments of the same. They have been thoroughly tested in Russia and found unable to cope with the rough-and-ready service demanded of them.

The Russian military authorities are particularly interested in the American motor truck in view of the impending reorganization of the entire army transport service. The following is the list of special types of trucks in which the Russian military authorities are particularly interested:

Motor trucks fitted for carrying military stores, motor trucks fitted for transporting aeroplanes, motor trucks fitted for radio-telegraph stations, motor cars fitted with radiography stations, searchlight motor cars, field kitchen motor cars, freight wagons fitted for smithy and fitting workshop, tank motor trucks, motor cars with armored body for quick-firing guns, sanitary motor cars for carrying wounded and sick, motor cars fitted for being used as field surgical operation rooms, freight cars with appliances for receiving field stretchers with wounded, motor cars with an unarmored gun for firing at aerial craft, motor fore-carriages for fortress artillery, military telegraph motor cars, power plant cars, light motor cars for scouting and communication service, appliances for enabling motor cars to drive through moving sand, tractor cars, 70-80 horsepower, with three trailers for carrying 30.4 centimeter mortars, motor cars with 90 centimeter projectors, motor cars with cranes for lifting guns and various heavy loads when going up hill on steep slopes, and motor cars with radio-telegraph stations.

All the exhibits will be divided in twelve sections as follows:

Automobiles, complete, for sport, touring and city use; chassis for same. Only motor and chassis constructing firms will be admitted in this class, under obligation to exhibit but automobiles and chassis of their own manufacture, while the bodies need not necessarily be of their own construction.

Passenger-carrying parts of automobiles, car bodies and materials entering the construction of the same; tonneaus exhibited separately or mounted on chassis, without mention, however, of the chassis makers.

Exhibits bearing direct relation to military automobiling.

Automobiles for fire companies, ambulances and other specific purposes.

Motor trucks, vans and wagons for various industrial, commercial, public service and agricultural purposes; railroad cars and trains driven by combustion motors; auto buses and automobile sledges.

Combustion motors for automobiles and for industrial and agricultural purposes.

Motor cycles, bicycles; parts and accessories for the same.

Motor boats, parts and equipment for same; bodies, motors, propellers, etc.

Tires and rims for automobiles, motor cycles and bicycles; special tire-mounting contrivances, etc. Overhauling and repair outfits; detachable and demountable rims, etc.

Machinery, lathes and other plant for the equipment of automobile factories.

Automobile accessories, head and tail-lights, searchlights, sirens, horns, candles, carbureters, lubricating devices, motor trimmings, cocks and valves; automobile attire and objects of necessity or convenience for motorists, cyclists and tourists. Bibliography, photography, periodicals, drawings.

Fuel: benzine, gasoline, alcohol, crude oil, etc. Lubricants: oils, greases and mixtures. Illuminants for lamps and searchlights. Special tanking for oils, benzine, etc.

Street Cleaners Engineers

Paris Examination for Post on Motor Squad Severe—Automobile Racing for Christmas in Mexico

PARIS, Nov. 27—There is no room for green hands in the motor street sweeping service of the city of Paris. The government driving license, delivered after a practical examination, is the least important of the requirements, for while it is considered necessary that the operator should be able to drive, mechanical skill is considered of still greater importance. In order to be admitted to the ranks of the motor street sweepers all applicants must successfully pass the following tests: Forge a small part according to drawing supplied; solder; adjust and assemble various forged parts; bearings, pulleys, flywheels, crankshafts, transmissions, gearsets, ball bearings, etc.; case hardening, brazing, soldering, the making of pipe joints for automobiles. Complete dismounting of a gasoline motor, assembling same and tuning up; fitting various kinds of lubricators, also cooling systems by pump and thermo-syphon and with and without fan; fitting and regulating a carbureter for gasoline or benzol; fitting and regulating an ignition system by magneto or storage batteries; fitting and regulating a clutch; change certain parts in a gearset and a differential; assemble and regulate brakes and steering gear. Finally, the candidates must find the causes of a breakdown in a motor and remedy them and also show their ability to verify the condition of a machine before taking it out.

Arrangements have been made by the Paris municipality for the gradual displacement of all horse-drawn vehicles for street sweeping and watering.

Mexicans Prepare for Xmas Race

CITY OF MEXICO, MEXICO, Dec. 7—The automobile devotees in this city, as well as in other parts of Mexico, are much interested in the City of Mexico-Pueblo road race that is to be run on Christmas day. This will be the fourth annual running of this race and the event is arousing more interest this year than ever before. The race will be from this city to Pueblo and return. The committee in charge of the event has decided not to divide the race into a contest beginning one day and finishing the next, but the round trip of the racing cars will be made in a single day.

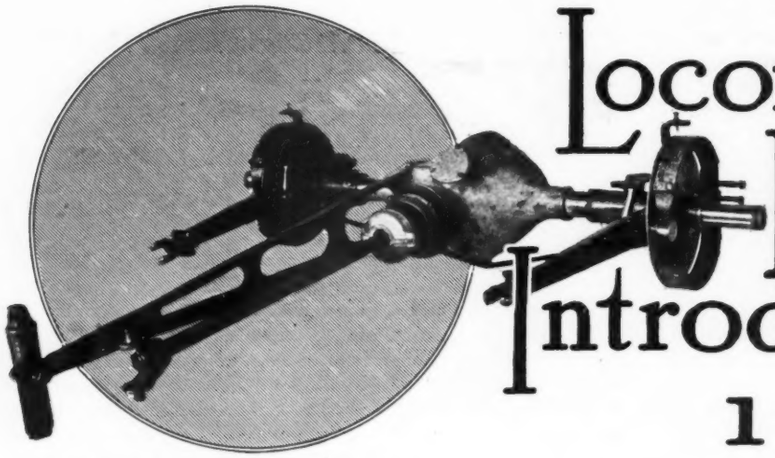
Prospects are bright for a larger entry list than ever before and it is believed that every prominent car in the country will be represented.

The cars will be divided into three classes, the same as last year, the most powerful cars running in class A, which is for automobiles of over 350 cubic inches cylinder capacity. Class B for cars of between 230 and 350 cubic inches cylinder capacity and the small class C, for cars of less than 230 cubic inches cylinder capacity.

The automobiles in class C will run only as far as Calpulalpam and return, thus making the round trip for this class 160 kilometers, as compared with 320 kilometers for classes A and B. Class C cars will be the last to leave Mexico and the first to return. From the time the last car leaves in the morning until the first returns in the afternoon there will be an interval of, probably, not more than 3 hours.

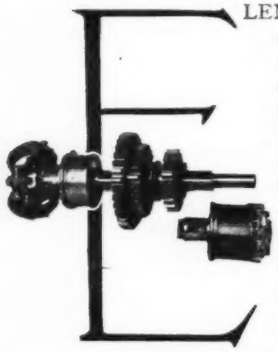
The position of the cars will be published at intervals on a bulletin board in front of the grandstand, at San Lazaro, so that the public can follow the progress of the race from start to finish.

The race is being arranged under the auspices of *El Automovil* en Mexico and *El Imparcial*.



Locomobile Little Six Introduced for 1913

Mounting of torque rod and rear axle



Part view of Locomobile gearset

ELEMENTAL design has undergone little change in the Locomobile line for 1913, but many minor refinements and changes in dimensions have been made. Of chief interest, however, is the little six, introduced for this season. It has been designed to meet the demand for six-cylinder cars of moderate cylinder dimensions. Besides the small six there is a larger six-cylinder car and a four-cylinder. The maker's horsepower ratings in all these models, which are known as the M, R and L respectively, are far below the horsepowers actually developed. In order to show the performances a horsepower and torque curve plotted on a basis of revolutions per minute is given in Fig. 6. The ratings of the models M, R and L are given in the table below. The bore and stroke are also given and it will be noted that the six-cylinder motors have all a larger stroke-bore ratio than has the four-cylinder motor. The dimensions are:

Model	Cylinders	Bore	Stroke	Rated H.P.
R	6	4.50 inches	5.5 inches	48
M	6	4.25 "	5.0 "	38
L	4	4.50 "	4.5 "	30

The principal changes to be noted are in the motor dimensions on the larger six-cylinder car. The stroke has been increased to 5.5 inches and this has, of course, necessitated changes in the connecting rod and cylinder lengths. An increase in the horsepower of the motor has been the effect of this change, the motor showing 82 horsepower at 1,800 revolutions per minute. The horsepower and torque curves are given in Fig. 6 and show the performance. Other changes which may be remarked are the increased valve sizes, changes in the form of the inlet and exhaust passages and a new design of Locomobile carbureter. The latter differs from the former Locomobile product by its longer throat and the use of both hot-air and hot-water jackets. A six magnet magneto takes the place of the former type while refinements in the oiling system of the 1913 cars consist of a shift of the oiling pump drive from the exhaust to the inlet side of the motor. The oil-level pet cock has been placed on the left side of the reservoir in the motor base. A new type of main bearing oil lead has been fitted to give an increased flow of the lubricant and also to give a more direct flow. Changes in the cooling system consist in the enlargement of the radiator and pump as well as the waterjackets. The installation of the generator for the electric lighting system has necessitated a change in the water inlet manifold. Increases in the size of parts in the transmission units have been necessitated by the larger power which they are compelled to carry. Tires are now carried at the rear on brackets which are a unit with the frame of the car and the running boards have been left clear to give a clean appearance. A motor tire pump forms part of the 1913 equipment.

As the practice is the same in the design and construction of both sixes, a description of the larger will cover the general design. The exterior appearance of the motor is shown in Figs. 1 and 2, giving the left and right sides respectively. It will be noted that the cylinders are cast in pairs and are mounted with a space between, giving a hint of large bearing space. In the sectional views given in Fig. 4, an idea of the transverse and longitudinal arrangements may be gained. It will be seen that the cylinders are T-shaped castings. They are composed of the standard grey cylinder iron and have the side waterjackets integral and the upper part separate. The 5 1-2 inch long pistons are also composed of grey iron and are fitted with five rings, four of which are located above the wristpin. A ring which serves as an oil distributer is at the bottom. The wristpins are located at the centers of the pistons and are held in place by two studs which are locked by a wire passing across their inner extremities. The material in the wristpin is chrome nickel steel case-hardened and fitted with a bronze bushing for the upper connecting-rod bearing. The diameter of the wristpin is 7-8 inch on the large six, which may be taken as a standard to show the proportions which exist throughout Locomobile design and which car is specifically described in the following.

The connecting-rods are 11 7-8 inches in length and are composed of chrome-nickel steel. The big end bearings on the big six are 2 1-4 inches in length and on the little six are 2 inches. The seven-bearing crankshafts have large bearings between the cylinder blocks and smaller bearings between cylinders forming part of the same casting. The smaller main bearings on the big

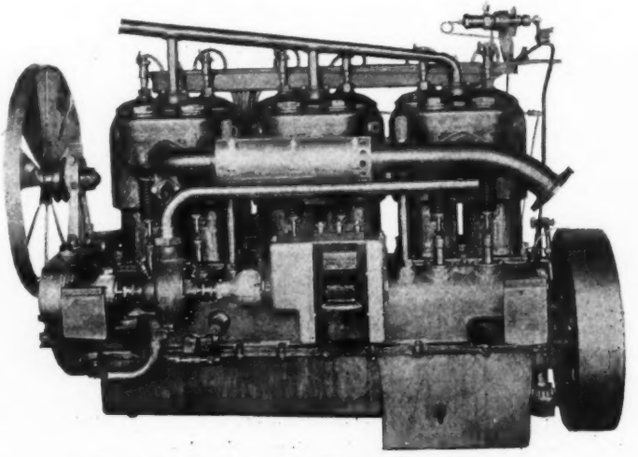


Fig. 1—Left side of model R Locomobile motor

six are 1 7-8 inches and those between blocks are 2 1-2 inches. The crankshaft is made of chrome nickel steel and being supported on the seven bearings lined with Parsons white metal bushings gives a stiff and lasting installation.

The valve action is clearly illustrated in Fig. 4. As will be noted, the cams act directly upon the roller followers giving a minimum of linkage with silent and quick action. The tappet guides are lengthened out to prevent a troublesome leakage of oil around this part of the motor. No covers are placed over the valve action, silence being secured by a close adjustment between the tappet and valve stem. A cold clearance of .003 inch is allowed at this point. The cams are cut integrally with the camshaft and hence have no tendency to become loose. The camshaft is driven through the spiral timing set. The Locomobile company has gone over to the spiral gear and has secured silence by eliminating back lash. The limit to which each gear is finished is within .00025 inch, and noise from this quarter is eliminated. The pitch of the gears in the model M is 11 and in the model R 12.

The cooling circulation is attended to by a centrifugal pump located on the right side of the motor. It is shown in Fig. 1, near the forward end of the motor and is operated off the same shaft as the generator. As may be seen from this view the water intake manifold has been lifted above the generator and runs back just below the exhaust pipe. Cooling is further aided by a six-plated aluminum fan mounted on a bracket fixed to the timing gear case. The radiator is of the cellular type and as has been stated, is made larger for this season.

The ignition system is by the high-tension dual consisting of magneto, storage batteries, and coil. The storage battery is used independently for ignition, and consists of three cells providing a current of 6 volts. This same system is used on all three models and is independent of the lighting and starting. The remainder of the electrical equipment is used for the lighting system. It consists of the Adlake dynamo battery and regulator. The dynamo operates when the motor has reached a certain speed and supplies the current for the lights at that time. The battery takes care of the lights while the dynamo is not in operation. The regulator maintains a constant voltage and protects the lights and filaments. This system is protected from the effects of overload by a fuse system so arranged that they may be easily reached on the removal of a cover plate. The electric horn is also protected by a 10-ampere fuse.

Among the innovations for the season of 1913 is the carbureter used on the little and big six-cylinder cars. This carbureter is of the eccentric float type and is heated by either hot air or hot water. The air valve of this carbureter is distinctive. It is provided with two springs, the smaller and stiffer of which operates only at comparatively only high engine speeds. At lower speed the amount of opening is controlled by the larger and weaker spring.

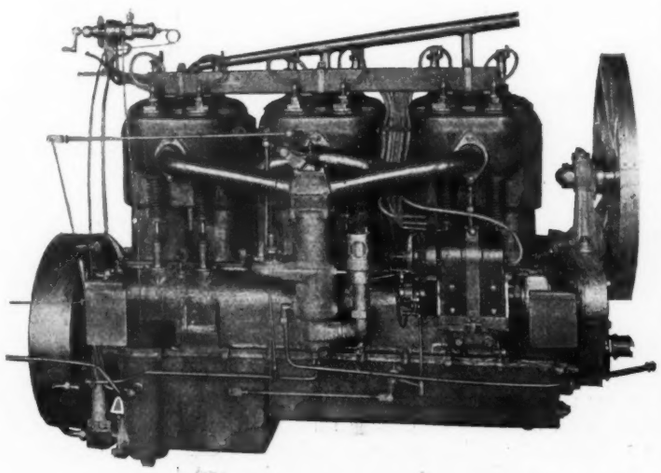


Fig. 2—Right side of model R Locomobile motor

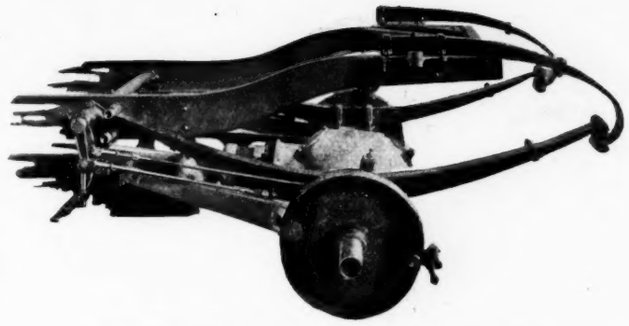


Fig. 3—Locomobile suspension and brake assembly

Oiling is accomplished by combination of the force-feed and splash systems. The crankcase is made in two parts, the lower forming the oil reservoir and containing the troughs necessary to the splash, and the upper which is composed of manganese bronze, carrying and supporting crankshaft and camshaft bearings. The oil capacities for the models M, R, and L are 2.25, 3.5 and 2.5 gallons respectively. The main reservoir on the 38 and 48 horsepower motors is carried at the rear of the crankcase casting. Fom here it is lifted by the gear pump driven off the inlet camshaft to a series of leads through the bronze part of the crankcase to each main bearing. The leads are cored through the centers of the web or bridge carrying the main crankshaft bearing. A hole drilled in the main bearing bushing registers during a portion of each revolution with the opening at the end of the oil lead. During this time oil is forced under the pressure of the pump, against the centrifugal force at this point, and is forced to enter the drilled crankshaft. Following the drilled duct through the crankshaft the oil is led to the lower connecting rod bearings and supplies these copiously with lubricant. Excess oil drains to the splash troughs, located below each cylinder and keeps these constantly filled. A test made on the oil pump used in the Model M car is shown in Fig. 7. As will be noted the output between 100 and 1,000 revolutions per minute increases directly as the speed of rotation. The output of the pump is such that it will at all times furnish a greater supply of oil than is needed, so that there will be an overflow from the splash troughs back to the reservoir in the crankcase. The course of this overflow may be noted in the longitudinal section given in Fig. 4. In order to prevent any bad effects which might occur from recirculating the oil, wire gauze screens are placed between the reservoir and the circulating pump.

The starting system is the Disco acetylene. The acetylene tank which is carried for use with this starter has no other purpose, as all the lighting throughout the car is taken care of by electricity.

Forty-three hardened saw steel disks are used in the clutch, which is of the conventional multiple-disk type housed within the flywheel. The clutch on the four-cylinder model is a leather-faced cone. The multiple disks on the two six-cylinder cars run in a bath of engine oil and kerosene in equal parts. The clutch disk retainer, or in other words the driven member of the clutch is supported upon a double row of ball bearings at the motor end and upon a single large ball bearing at the other end. A feature of the clutch which is worthy of comment is the fact that it can be removed from the car without interfering with any other member and any repairs necessary can be made in a correspondingly short time and hence with less expense.

Between the clutch and the gearset is a universal joint. The gearset which is standard for the Locomobile line has four forward speeds and reverse. The backlash on these gears is limited to .001 inch and the grinding work is done to limits of .00025. This gives a silent and long wearing gear. Ball bearings are used throughout and the lubricant to be used is a light gear compound. The capacity of the gearset is 20 1-2 pounds of grease.

A chrome nickel steel propeller shaft transmits the power to the rear axle. At each end there is a universal joint. The shaft is not enclosed in a torque tube but there is a deep strut as shown

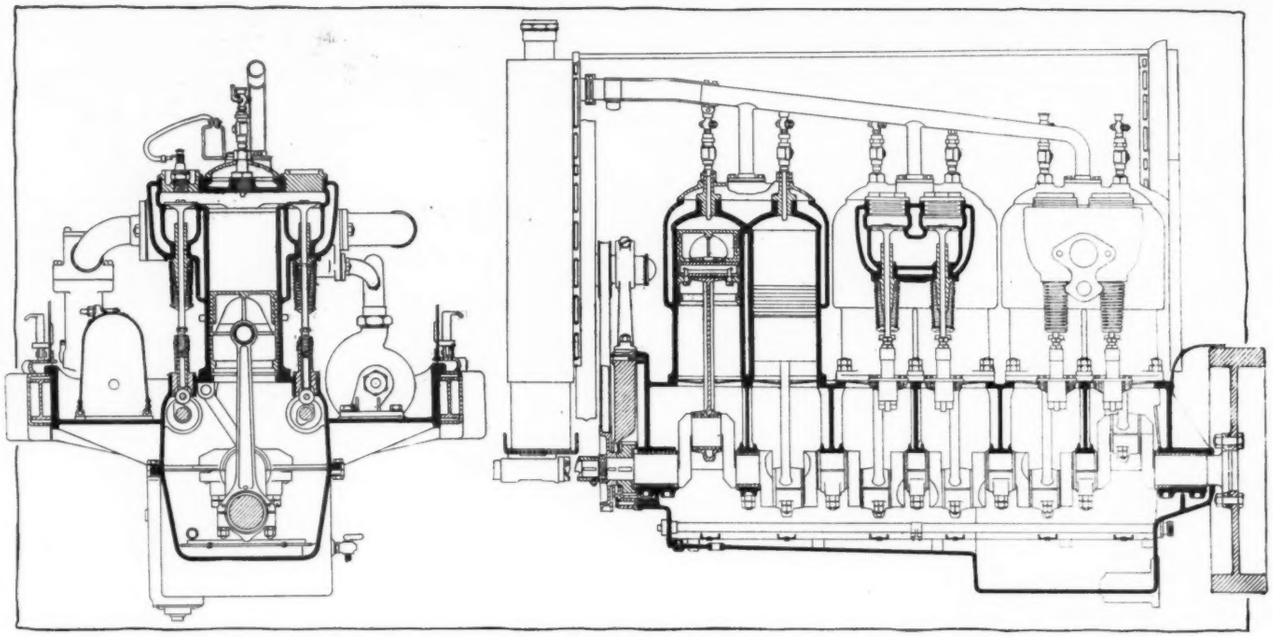


Fig. 4—Transverse and longitudinal cross-sections of model M Locomobile motors, showing details of construction

at the head of this description, which is bolted rigidly to the rear axle and flexibly to a cross member of the frame. This torque member tapers from its rear connection to the forward point of suspension giving it a triangular shape. To lighten it without materially cutting down its strength or rigidity the web of the channel is left open as shown in the illustration. The material of which this member is composed is pressed steel. Two radius rods take up the drive allowing the rear springs to be free as far as the drive is concerned and leaving their only duty the easing of the suspension of the car. The radius rods are steel castings and are bracketed to the frame.

The rear axle is bevel driven. Both the pinion and the gear are adjustable and changes can readily be made in the mesh of these two gears. Fig. 8 shows the rear axle housing with the cover plate removed allowing of an inspection of the gears. A smaller cover plate over the differential housing allows of a view of the pinion and large bevel gear. The adjustments on the pinion can be made through this opening while the adjustments on the bevel gear can be made through the opening left by the removal of the rear cover plate. The rear axle is built up of tubes which are forced into place under 9 tons hydraulic pressure. In addition to this the tubes are riveted. These tubes carry the load of the car as the axle is of the floating type.

Both sets of brakes are carried on the rear wheels. All the braking stress is taken through the radius rods, none of it is felt by the torque rod or springs. The dimensions of the brakes are 14 inches diameter and 2 inches face for the expanding and 14 7-16 inches diameter and 3 inches face for the contracting. Both sets of brakes are lined with asbestos fabric. The brake

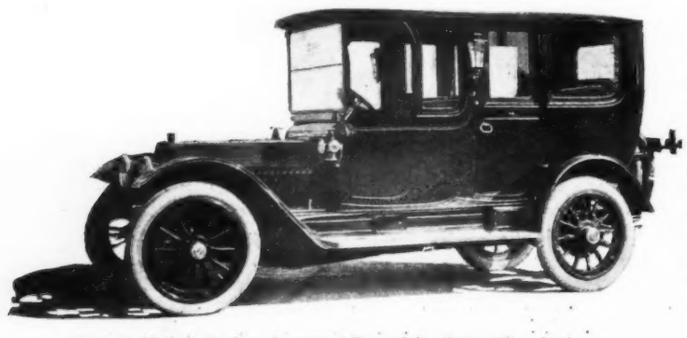


Fig. 5—Six-cylinder Locomobile with limousine body

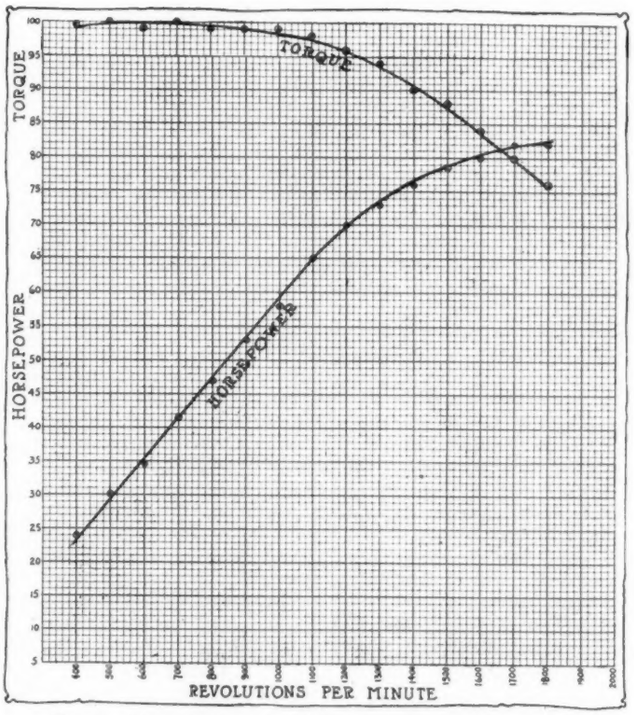


Fig. 6—Horsepower and torque curve of model R motor

adjustments are made by right and left threaded nuts on the emergency brake and by wing nuts on the service brakes. A view of the brakes, radius rod and spring suspension is given in Fig. 3. An equalizing bar is placed across the frame.

Semi-elliptic springs are used in front and three-quarter elliptic in the rear. The method of mounting these is shown in Fig. 3. There are ten leaves in the rear springs while for the heavier bodies such as the limousine, the number of leaves is increased. The spring clips used to fix the rear springs to the rear axle are nickel steel drop forgings. The spring connection at the front is also made by nickel steel clips. As the front axle is driven through the spring they are made extra heavy and the heads of the clip bolts are also upset so as to preclude the possibility of

losing one of the clips. The front axle is of I-beam section, with a drop at the center. The spring pads are integral with the upper flange. This axle is drop-forged from a one-piece nickel steel bar. A heavy dowel pin passes through the center of the spring and into the front axle to stiffen the construction against side motion. Tensile strength of front axle is 87,000 pounds.

The frame is a pressed steel channel bar, 4.5 inches in depth and with a flange ranging between 1.5 and 3 inches in width. The entire bar is pressed from 3-16 inch stock.

Twelve-spoke wood artillery wheels are used throughout. These wheels are all fitted with quick detachable demountable rims. The tire sizes differ for front and rear on the big six and for the three models are as follows:

Model	Front	Rear
M	36x4.5 inches	37x5 inches
R	36x4.5 "	36x4.5 "
L	34x4.5 "	34x4.5 "

Timken roller bearings are used for the front wheels. Roller bearings are also used on the steering gear which is of the worm and full gear type. The worm and gear are so arranged that six adjustments for wear are possible by removing the steering lever and turning a hexagonal nut. This brings a new portion of the gear in mesh with the worm and takes up the lost motion which occurs after a long period of use. Both the worm and the gear are case-hardened and if properly lubricated should not require adjustment for a long time. The roller bearings upon which the steering mechanism is carried are adjustable and wear is not likely to occur at that point.

A refinement incorporated on the 1913 Locomobiles is the cast aluminum cowl which is made a unit with the dash by bolting it

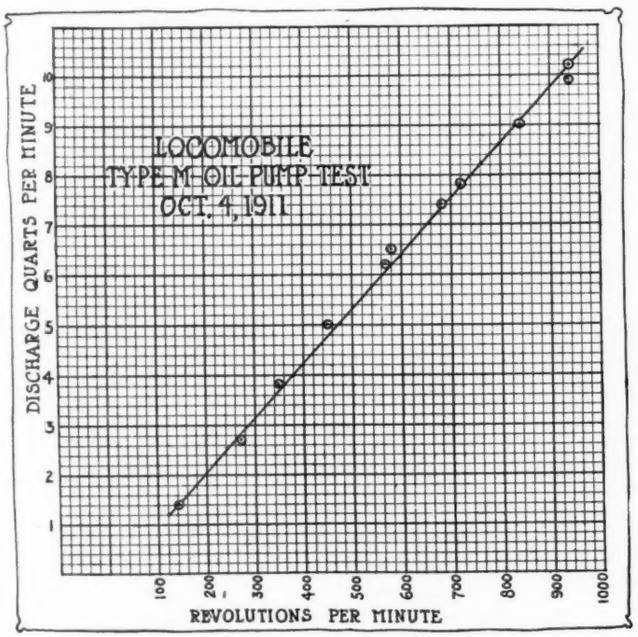


Fig. 7—Curve showing test results of model M oil pump

to the body sills. This silences body squeaks between the cowl and the dash.

Between the body and the frame is a layer of woven cotton belting material while the doors close against rubber blocks which silence their action and eliminate rattles. The drop-forged rear tire brackets are made a unit with the frame of the car so that there is a great amount of extra strength in these parts and they are not apt to shake loose. A refinement which may be mentioned is that the exhaust is carried out behind the car and is not allowed to escape beneath it. The muffler is very silent and is made up of a series of concentric perforated tubes, the perforations are at opposite ends of the tubes.

The 1913 cars are equipped with a single cylinder air compressor, having a bore of 2.5 inches, and a stroke of 2.5 inches. It is mounted on an extension of the front end of the transmission counter shaft, and driven by means of jaw clutches, which can be thrown in and out of engagement by a T-handle located on the left side of the car, and reached by opening a door in the running-board side shield. By drawing handle outward about 3-16 of an inch, advancing one notch to the left in a serrated segment and releasing jaw, clutches are interlocked, and pump is ready for use.

Fig. 8—Locomobile rear axle unit disassembled in parts

Air is drawn into cylinder through holes drilled around same below radiating fins. Foreign matter is excluded by means of a removable screen. On the upper stroke of the piston the air is forced out of the cylinder by unseating a flat valve into a small tank placed at the right of the air compressor, and mounted in front of the transmission carrying channel. The purpose of this tank is to overcome the pulsation of the pump only, and not to act as a reservoir.

By means of a two-way fitting, air is drawn out of the tank through a delivery tube leading to a fitting which projects through the left side member of the frame adjacent to the T-handle mentioned above. One end of the tire hose is screwed on to this fitting when tires are to be inflated. The location of the two-way fitting on the tank is such that any sediment or oil falls to the bottom of the tank, and is not drawn out through the delivery tube. With the motor running at normal speed the air compressor will inflate a 37 by 5 inch tire to 90 pounds pressure in about two minutes.

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THE MOST EFFICIENT rubber tire is naturally the tire that will roll along and offer the least resistance to rolling. In rolling over the relatively hard road surfaces the softness of the rubber allows it to spread, giving more surface in contact with the road; as against this the steel tire retains its shape, making an indentation in the road as it rolls along. As the composition of the road is not as efficient a spring as the rubber tire, the road resistance is naturally higher.

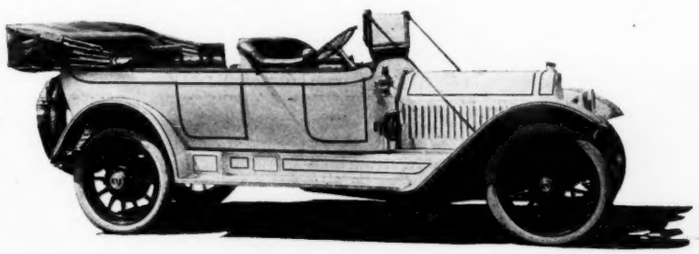
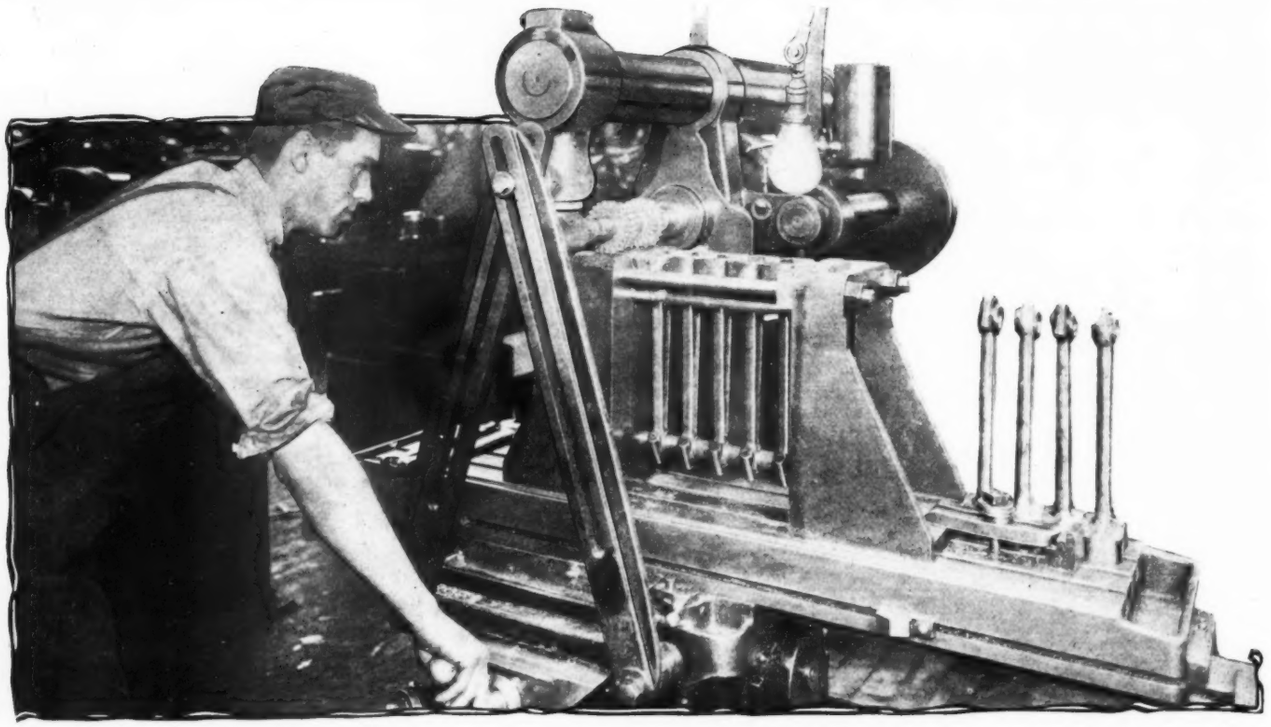


Fig. 9—Seven-passenger touring body on 1913 Locomobile

Factory Miscellany



Gang milling machine for milling connecting-rods in use at the factory of the White Company, Cleveland, O.

AT the White factory the connecting-rods are turned out in quantities. That is to say, production in quantity is possible with quality. This is accomplished by the use of machines which do several things at a time. They are called gang machines because the tools are grouped together in the same manner as a gang of men. In the above illustration one of the gang milling machines is shown at work. It is milling the big ends of five connecting-rods. It is doing this work in the space of time generally required to do two. It is saving the White company time and therefore money and is one of the instruments that enables the concern to put a low price on a high quality product. It is in machines of this kind that quantity production is given its true value. One man takes care of this machine. While it is doing the milling work on one set of five rods, the workman is setting up the next set. It takes a half hour to finish a set of five and the machine can work steadily all day turning out in the neighborhood of a hundred in a working day. Naturally, such a machine as this, though expensive, pays for itself in a short time.

ATWATER-KENT Adds Equipment—The Atwater-Kent Manufacturing Company, Wayne Junction, Pa., has recently installed a considerable amount of new machinery to take care of the machine work on the new model K Unisparker. The added equipment will increase the capacity of the plant to a marked degree.

Briggs-Detroiter Adds—The Briggs-Detroiter Company, Detroit, Mich., has acquired a tract of 3 acres adjoining its plant, to provide for future extensions.

Maritime Plant Nearly Completed—The Maritime Motor Car Company has its factory at Coldbrook, N. B., far advanced toward completion.

Willard's Four Plants—The Willard Storage Battery Company, Cleveland, O., has added to its plant, No. 1, three more buildings, affording 50,000 square feet of additional manufacturing space.

Interstate Tire Leases Land—The Interstate Automobile Tire & Rubber Company, Atlanta, Ga., has leased 33 acres and four buildings and will manufacture rubber tires and automobile accessories.

Precision Die-Casting Moves—The Precision Die-Casting Company, Syracuse, N. Y., has moved into its new office and plant which was formerly the factory of the E. C. Stearns Manufacturing Company.

Premier's Additions—The Premier Motor Manufacturing Company, Indianapolis, Ind., will build two additions to its plant. The new structures will be two stories high, one 40 feet by 140 feet, the other 48 feet by 140 feet.

Morris Purchases Factory—A. W. Morris, Philadelphia, Pa., has incorporated under the name of the Morris Manufacturing Company, and has negotiated for the purchase of the Wetherill Finished Casting Company's factory.

Firestone's New Building—The Firestone Tire 7 Rubber Company, Buffalo, N. Y., will erect a new four-story and basement building containing 30,000 square feet of space, which will be ready for occupancy about January 1, 1913.

Paige Building—The Paige Auto Hoist Company, Grand Rapids, Mich., will build a factory on a site recently purchased in that city. The company will manufacture a device for lifting the weight of an automobile from its tires when the car is not in use.

Will Increase Plant—Building plants and operations are under way at the Baker Motor Vehicle Company, Cleveland, O., which will increase the size of the factory by about 30 per cent. The first of the new buildings will be occupied by the truck department.

Kline Plant Opened—The Kline Motor Car Company recently opened its Richmond, Va., plant. It will give employment to approximately 750 skilled workmen, and will have a capacity of 2,000 machines a year. The new plant was built at a cost of $100,000.

Fiat Head Inspects Factory—Chevalier Giovanni Agnelli recently arrived on the Mauretania on an inspection trip to the Fiat factory at Poughkeepsie, N. Y. He will be accompanied by E. R. Hollander, president of the Fiat Motor Sales Company, New York City.

Federal Arranging New Plant—The Federal Motors Company, Indianapolis, Ind., is making arrangements to erect a new plant, which will consist of a one-story building, costing approximately $150,000, exclusive of machinery. The structure is to be of brick and steel.

Brockway Building—The Brockway Motor Company, Cortland, N. Y., is taking bids for the construction of a manufacturing plant 40 feet by 268 feet, one story, of concrete block construction. A considerable amount of machinery equipment will be installed.

Students Inspect Rambler Factory—Fifty students of the senior class of engineering from the University of Wisconsin visited the Rambler factory, Kenosha, Wis., recently and made a close inspection of the unit gasoline and electric motor with which the 1913 Rambler is equipped.

Hudson Adds Space—Hard on the heels of the recent announcement that the Hudson Motor Car Company, Detroit, Mich., was to erect a large new factory building, comes the news of still another. A second addition to the plant is to be built, which will result in the doubling of the factory in a year.

Everitt's Branch Factory—A branch factory of the Everitt Motor Company, Detroit, Mich., will be established at Windsor, Ont. The plant will be erected by the Tudhope Automobile Manufacturing Company. It will cost $100,000 and will occupy a 10-acre site. Building operations will commence in April of next year.

Palmer-Moore Buys—The large plant owned by the Syracuse Stove Company, Syracuse, N. Y., has been sold to the Palmer-Moore Company, that city, which will manufacture motor trucks. A 1,500-pound delivery wagon will be manufactured. According to the company's plans, there will be 150 hands employed and 200 trucks will be put out the first six months of 1913.

Packard Enlarges—To expedite the manufacture of the 38 and future models, the Packard plant, Detroit, Mich., already comprising 37 acres of floor-space, is being enlarged. Three buildings, constructed entirely of glass, concrete and steel, have been erected to conform to the Packard factory's system of shop units. The additions are practically complete and will be ready for occupancy by January 1.

Palmer's Ecorse Factory—The Palmer Motor Car Company will occupy the large automobile plant being constructed at Ecorse, Mich. It is expected that manufacturing in the new plant will be started about the first of the year. A large force of workmen is pushing the construction on as rapidly as possible. The new plant has a frontage of 358 feet on the main lines of all the railroads entering Detroit from the south.

Tire Plant Enlarged—The Goodyear Tire & Rubber Company, Akron, O., is adding three buildings. The company has acquired the entire property of the Akron branch of the Great Western Cereal Company. When the additions are entirely completed, the company will have a capacity of 8,000 tires a day. The three latest additions will aggregate 335,300 square feet of floor-space. This brings the total up to 1,935,300 square feet.

Shows, Conventions, Etc.

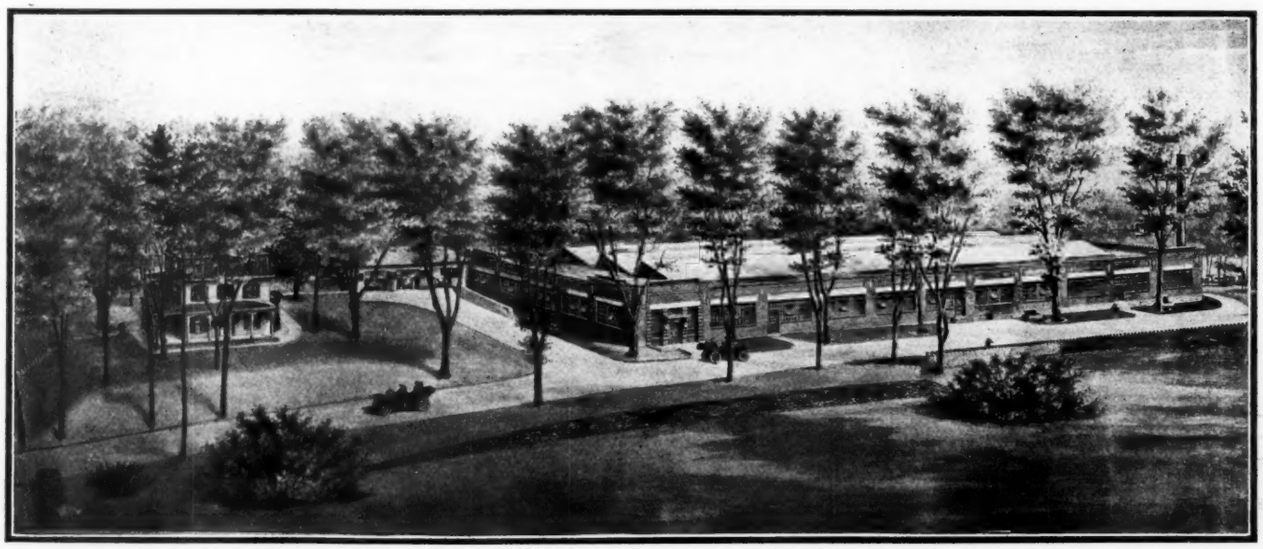
Jan. 2-10.....New York City, Importers' Salon, Hotel Astor, Importers' Automobile Alliance.
Jan. 4-11.....Cleveland, O., Annual Automobile Show.
Jan. 4-11.....Montreal, Que., Montreal Motor Show, Drill Hall and 65th Regiment Armory.
Jan. 11-18.....Milwaukee, Wis., Annual Show, Auditorium, Milwaukee Automobile Dealers' Association.
Jan. 11-25.....New York City, Thirteenth Annual Show, Madison Square Garden and Grand Central Palace, Automobile Board of Trade.
Jan. 18-25.....Philadelphia, Pa., Annual Automobile Show.
Jan. 21-26.....Toledo, O., Annual Show, Exposition Building, Toledo Automobile Shows Company.
Jan. 25-Feb. 1.....Montreal, Que., Automobile Exhibition, R. M. Jaffray, Manager.
Jan. 27-Feb. 1.....Philadelphia, Pa., Truck Show.
Jan. 27-Feb. 1.....Buffalo, N. Y., Annual Automobile Show.
Jan. 27-Feb. 1.....Detroit, Mich., Annual Automobile Show.
Jan. 27-Feb. 1.....Ottawa, Ont., Ottawa Motor Show, Howick Hall, Louis Blumenstein.
Jan. 27-Feb. 1.....Scranton, Pa., Annual Automobile Show, Hugh B. Andrews.
Feb. 1-8.....Chicago, Ill., Annual Automobile Show.
Feb. 10-15.....Chicago, Ill., Truck Show.
Feb. 10-15.....Minneapolis, Minn., Annual Automobile Show.
Feb. 12-15.....Geneva, N. Y., Automobile Show, Armory, Louis Blumenstein.
Feb. 15-22.....Newark, N. J., Annual Automobile Show, First Regiment Armory, New Jersey Automobile Exhibition Company.
Feb. 17-22.....Kansas City, Kan., Annual Automobile Show.
Feb. 18-22.....Baltimore, Md., Annual Show, B. A. D. A.
Feb. 19-22.....Bloomington, Ill., Annual Show, Coliseum, McLean County Automobile Club.
Feb. 20-22.....Canandaigua, N. Y., Automobile Show, Louis Blumenstein.
Feb. 22-Mar. 1....Brooklyn, N. Y., Annual Show, 23rd Regiment Armory
Feb. 24-27.....Kansas City, Mo., Truck Show.
Feb. 24-Mar. 1.....Cincinnati, O., Annual Show, Music Hall, Cincinnati Automobile Dealers' Association.
Feb. 24-Mar. 1.....Omaha, Neb., Annual Automobile Show.
Feb. 24-Mar. 1.....Paterson, N. J., Annual Show, Paterson Automobile Trade Association.
Feb. 26-Mar. 1....Glen Falls, N. Y., Automobile Show, Louis Blumenstein, Manager.
March 3-8.....Pittsburgh, Pa., Annual Automobile Show.
March 3-14.....Des Moines, Ia., Annual Show, Coliseum.
March 8-15.....Boston, Mass., Annual Automobile Show.
March 12-15.....Ogdensburg, N. Y., Automobile Show, Louis Blumenstein, Manager.
March 18.....Syracuse, N. Y., Annual Show, Syracuse A. A.
March 19-26.....Boston, Mass., Annual Truck Show.
March 20-24.....New Orleans, La., Annual Show, N. O. A. D. A.
March 24-29.....Indianapolis, Ind., Annual Automobile Show.

Race Meets, Runs, Hill Climbs, Etc.

May 30.....Indianapolis, Ind., 500-Mile Race, Speedway.

Foreign

Dec. 7-22.....Paris, France, Paris Automobile Show, Grand Palais.
Jan. 11-22.....Brussels, Belgium, Annual Belgian Automobile Show, Centenary Palace.
March .....France, Sealed Bonnet 3000-Mile Run.



Factory of the Atwater-Kent Manufacturing Company, Wayne Junction, Pa. Mr. Atwater-Kent's house and garage at the left

Gathering of the American Automobile Association at its annual Banquet during the recent session of the organization in Chicago

WANT Automobile Laws Amended—A delegation representing different automobile clubs in Canada waited on the provincial treasurer recently in Quebec, Que., asking for certain amendments in the law governing automobiles. Among the important amendments asked is the increase of the speed limit to 15 miles in the cities and to 20 in the country. It is also asked that the distance for judging the speed of an automobile should not be less than .125 mile in cities and .5 mile in the country.

National Hartford Equipped—The National car is now being equipped with Truffault-Hartford shock absorbers.

Berry Apointed Manager—The H. W. Johns-Manville Company, New York, has appointed C. S. Berry manager of its Atlanta, Ga., office.

Overland Branches Established—The Overland Automobile Company, Phoenix, Ariz., has opened branches in Tucson, Yuma and Kingman, that state.

Grant Leaves Racing Game—Harry Grant has joined the staff of the Jackson's Boston, Mass,. branch. Mr. Grant says he has left the racing game.

Holley at Foreign Shows—Holley Brothers Company, Detroit, Mich, manufacturer of the Holley carbureter, will exhibit at the Olympia and Paris shows.

Grossman Sails—Emil Grossman has sailed for Europe to attend the automobile Salon at Paris, and the Olympia Show at London. He will return in time for the Madison Square Garden Show.

Holley Coventry Branch—Holley Brothers Company, Detroit, Mich., manufacturers of the Holley carbureter, has established a branch in England at 46 Northumberland Road, Coventry.

Duncan with U. S. Motors—Announcement is made of the appointment of Henry M. Duncan as supervisor of the eastern district of the United States Motor Company in place of W. F. Smith, resigned.

Mesker Resigns—L. H. Mesker, manager of the St. Louis, Mo., branch of Manning, Maxwell & Moore, Inc., has resigned his position to be connected after January 1 with the Ferro Machine & Foundry Company, Cleveland, O.

Montreal's Show—Two hundred and fifty automobiles, 210 of the pleasure type and 40 trucks, will be on exhibition at the coming annual automobile show, to be held under the auspices of the Automobile Club of Canada, Montreal, Que.

Matheson Branch Closes—The Matheson Automobile Company has closed its branch in Boston, Mass., after an existence of about one year. The branch was taken over from an agency conducted by Roy Faye, who had the car for some years.

Minneapolis Club Elects—The annual election of the Minneapolis, Minn., club officers was held recently, the following officers being elected: President, H. J. Clark; vice-presidents, W. P. Devereux and T. N. Kenyon; secretary, G. Roy Hill; treasurer, J. H. Prior.

Canadian Good Roads Movement—The work of raising $100,000 to build a tourist road between Ottawa, Ont., and Prescott, will be commenced at once, according to a decision reached at a recent general meeting of the Ottawa Valley Motor Car Association.

By Way of Correction—In the November 14, 1912, issue of THE AUTOMOBILE, under the heading New Agencies Established During the Week, the address of Brownell & Burt, handling the Federal truck, should have been given as Taunton, Mass., and that of H. Baxter, also Federal truck agents, as Springfield, Mass.

Marmon Reaches Los Angeles—The Marmon hundred century car reached Los Angeles, Cal., recently. The car, because of its schedule to cover 10,000 miles in 100 running days, was slightly ahead of its schedule when it reached Los Angeles, having covered the 2,828 miles in 27 days. The return trip to Indianapolis, Ind., will be begun next spring.

Cuyahoga County Leads—The annual report of Registrar J. A. Shearer of the State Automobile Department, Ohio, on the number of chauffeurs in that state, shows some interesting figures. Cuyahoga County leads with 1,770, while Hamilton is second with 1,322 and Franklin third with 772. Vinton is the only county appearing without a licensed chauffeur.

Marker's Road Plans—State Highway Commissioner J. M. Marker, Ohio, has made his plans known in reference to road building in Ohio for 1913. He will request that the legislature appropriate $1,700,000, which would give every one of the 88 counties in the state $20,000 each. He will ask the legislature to provide for a one-half mill levy on good roads construction during 1914.

New Agencies Established During the Week

COMMERCIAL VEHICLES

Place	Car	Agent
Albany, N. Y.	Stewart	Dominant Motor Car Co.
Ankeny, Ia.	Empire	Blewett Auto Co.
Arapahoe, Neb.	Cartercar	C. W. Gearhart
Archer, Neb.	Nyberg	W. T. Grace
Auburn, Neb.	Little	Workman & Rozean
Auburn, Neb.	Reo	Workman & Rozean
Avoca, Ia.	Little Four	Nort & Derby
Ashton, Ia.	Empire	Yappen & Son
Baltimore, Md.	Metz	International Mfg. Co.
Belleville, Ill.	Empire	G. W. Sahlender
Blairsville, Pa.	Lozier	Blairsville Auto Co.
Boone, Ia.	Empire	Boone Auto Co.
Boston, Mass.	Stewart	C. B. Johnson Co.
Boston, Mass.	Stewart	C. B. Johnston & Co.
Boston, Mass.	Flanders	C. A. Malley
Boonville, Ind.	Empire	Boonville Auto Co.
Braddock, Pa.	Empire	C. R. Baldrige
Bristow, Ia.	Empire	Bristow Automobile Co.
Cambridge, Mass.	Empire	John J. Gibson Co.
Buffalo, N. Y.	Atterbury	Blake Auto Co.
Cheyenne, Wyo.	Cole	Boyle & Joslee
Chicago, Ill.	Stewart	Voltz Bros.
Chicago, Ill.	Empire	Ralph Temple Auto Co.
Cleveland, O.	Empire	C. J. Reeve
Cleveland, O.	Moon	The Brandt Motor Car Co.
Cleveland, O.	Empire	C. J. Reeve
Calgary, Alta.	Cole	Central Garage & Machine Shop
Columbia, Mo.	Cole	Columbia Automobile Co.
Columbia, S. C.	Lozier	Philip D. Kohn
Columbus, O.	Empire	S. W. Schott & Co.
Columbus, O.	Moon	E. A. Smith
Colorado Springs, Col.	Haynes	E. D. Marr.
Columbus, Nebr.	Cartercar	Murnan Taxicab Co.
Columbus, Neb.	Empire	Columbus Auto Co.
Connersville, Ind.	Empire	Ye Motor Shop
Corning, Ia.	Empire	Sherman Bradley
Corwith, Ia.	Empire	F. B. Glidden Co.
Dayton, O.	Cole	Cole Sales Co.
Decatur, Ill.	Moon	N. Main St. Garage
Detroit, Mich.	Standard	Standard Motor Truck Co.
Detroit, Mich.	Empire	Wahl Motor Sales Co.
Durham, N. C.	Cole	John H. Harris
Earlham, Ia.	Empire	Moreland Automobile Co.
Edmonton, Alta.	Cole	International Motor Co.
Emerald, Wis.	Cole	W. S. Fleming
Erie, Pa.	Empire	Stirling Bros.
Fall River, Mass.	Cole	F. W. Davis & Co.
Glenwood, Ia.	Empire	J. M. Michelwait
Hempstead, L. I.	Cole	W. T. Hutcheson
Hillsdale, Mich.	Cole	Dr. H. C. Miller
Houston, Texas.	Moon	Northrup & Clark Co.
Indianapolis, Ind.	Mais	Archey-Atkins Co.
Knightstown, Ind.	Cole	M. E. Reagan
Lawrence, Mass.	Cole	Jackson St. Garage
Lewisburg, Pa.	Empire	Jordan-Warneke Motor Car Co.
Lincoln, Neb.	Cole	Joe Simon
Little Rock, Ark.	Lozier	H. Tysinger
Los Angeles, Cal.	Moon	L. C. Buxton
Lynn, Mass.	Cole	W. W. Whitney & Co.
Lynnfield, Mass.	Cole	E. M. Elder
Madison, Wis.	Empire	Spooner McConnell Motor Car Co.
Maitland, Mo.	Cole	Rowlette Auto Co.
Marks, Miss.	Cole	J. H. Edwards
Martin, Tenn.	Cole	G. E. Bowden
Massillon, O.	Empire	Wm. F. Wagner
McCools, Neb.	Cartercar	McCools Mach. & Iron Wks.
McMinnville, Ore.	Cole	Younger & Prigmore
Memphis, Tenn.	Empire	McDonald Auto Co.
Memphis, Tenn.	Moon	Chickaway Motor Car Co.
Memphis, Tenn.	Moon	Chickasaw Motor Car Co.
Milwaukee, Wis.	Empire	Oakland Wisconsin Motor Co.
Mitchell, S. Dak.	Moon	Central Auto Supply Co.
Mitchell, S. D.	Moon	Central Auto Supply Co.
Moira, N. Y.	R-C-H	W. S. Lawrence
Mondovi, Wis.	Detroiter	G. P. Goddard
Mokane, Mo.	Empire	R. W. Taylor
Moneta, Ia.	Moon	Louis Ruwe
Montreal, Que.	Brockville-Atlas	V. O. Reed
Montreal, Que.	Hupmobile	V. O. Reed
Morgantown, W. Va.	Cole	Colonial Motor Car Co.
Mount Carmel, Pa.	Haynes	Dr. B. F. Bartho
Mt. Auburn, Ill.	Cole	H. S. Armstrong
Mt. Carmel, Ill.	Empire	Beauchamp & Horton
Muscatine, Ia.	Haynes	F. C. Vetter
Mystic, Conn.	Franklin	Mystic Auto Station
Nevada, O.	Empire	G. E. Eckert
Newark, N. J.	Lozier	Lozier-Stutz Sales Co.
New Bern, N. C.	Cole	H. Evans Sledge
Newton, Ill.	Cole	Newton Motor Car Co.
New York City.	R-C-H	Julius Lichtenstein
Norfolk, Va.	Haynes	Tidewater Auto Gar. Co.
North English, Ia.	Haynes	E. J. Smith & Sons
Onawa, Ia.	Empire	M. B. Pullen
Otterbein, Ind.	Empire	John B. Opp
Ottona, O.	Empire	Hank Bros.
Pine Bluff, Ark.	Cole	Hearn Auto Co.
Phoenix, Ariz.	Case	McArthur & Morse
Phoenix, Ariz.	Hupmobile	J. C. Morrison
Phoenix, Ariz.	Little	H. G. Murphy
Phoenix, Ariz.	Michigan	Wilson & Jones
Phoenix, Ariz.	Oakland	Geo. Hageman
Piqua, O.	Franklin	Meinder's Garage
Pittsburg, Pa.	Empire	Williams-Hasley Motor Car Co.
Pittsburgh, Pa.	Haynes	McKeesport Clariton Trans. Co.
Plattsmouth, Neb.	Cartercar	Kroehler Bros.
Providence, R. I.	Stewart	Portland Garage
Providence, R. I.	Velie	Providence Auto Co.
Punxsutawney, Pa.	Cole	W. L. Simpson
Regina Sask., Can.	Cole	H. A. Gordon
Roanoke, Va.	Lozier	Hunter Motor Co.
Schaller, Ia.	Empire	C. H. Reuber
Severy, Kan.	Empire	R. A. Reese
Shenandoah, Ia.	Rambler	Hand & Woodard
Shreveport, La.	Empire	C. F. Brown Auto. Co.
Shreveport, La.	Moon	Orme Motor & Transfer Co.
Sidney, Neb.	Franklin	McIntosh & Brewer
Sioux City, Ia.	Empire	Central Machine Works
Somerset, Pa.	Empire	Somerset Auto. Co.
Somerville, N. J.	Cole	Augustus Duryea
Spencer, Neb.	Nyberg	W. P. Moore
Springfield, Mass.	R-C-H	Shean Auto Station
Stewart, Ill.	Haynes	Shearer Bros.
Springfield, O.	Cole	Valentine King Garage
St. Louis, Mo.	Kentucky	Wiemeyer Motor Car Co.
St. Louis, Mo.	Staver	Moss & Kavanaugh
St. Paul, Minn.	Cole	The Motor Truck Co.
Tacoma, Wash.	Cole	E. M. Streeter
Tifton, Ga.	Lozier	H. H. Tift, Jr.
Timewell, Ill.	Empire	H. K. Patterson
Toledo, O.	Moon	Moon Sales Co.
Toronto, Canada.	Empire	W. W. Campbell
Toronto, Ont.	Henderson	American Motor Sales Co.
Troy, O.	Franklin	Troy Auto Co.
Uniontown, Pa.	Lozier	Keystone Automobile Co.
Vandergrift, Pa.	Empire	S. M. & E. R. Painter
Washington, Mo.	Moon	C. A. Krumsick
Washington, D. C.	Stewart	David S. Hendrick
Wellsburg, W. Va.	Cole	W. J. Hervey
Wichita, Kan.	Empire	Peru Van Zandt Implement Co.
Wilkes-Barre, Pa.	Moon	Thos. W. Haines, Jr.
Worcester, Mass.	Flanders	Cashman Auto Co.
Wilkes-Barre, Pa.	Haynes	C. D. Hersberger
Wilkes-Barre, Pa.	Moon	T. W. Haines, Jr.
Wilmington, Del.	Stewart	Gomery-Schwartz Motor Car Co.
Youngstown, O.	Empire	C. F. Erb
Youngstown, O.	Moon	Regal Sales Co.
York, Neb.	Cole	Corcoran & Foley

Opens Branch House—The Riddell Automobile Company, Des Moines, Ia., has opened a branch house at Oskaloosa, Ia.

Acquires Fire Apparatus—Grand Rapids, Mich., has just placed into service a combination White hose and chemical wagon.

Overland Cars for Polo—President John Willys, of the Willys-Overland Company, Toledo, Ohio, has become so interested in the lately invented game of automobile polo that he is discussing seriously the construction of Overland cars with planetary system gears for use in the game.

Hunting by Automobile—Hunting by automobile has become a favorite sport in the ranch region of South Texas. It is now a common practice for parties of sportsmen to take a spin over the ranch roads into the heart of the mesquite and wilderness and return with a load of wild game. The cars are also convenient for hauling in the game. It is not an uncommon thing to witness the arrival of parties with their cars literally loaded down with the fruits of their marksmanship. The accompanying illustration shows a car returning from a very successful hunt, loaded down with deer, jack rabbits, cotton tail rabbits, possums, badgers and coyotes.

The way they go after the game in Texas and how they get it

White ten-passenger bus carrying tourists over mountainous roads in Mount Rainier National Park, Wash.

Tourists traveling through Mount Rainier National Park embarking in motor buses at Longmire's Inn

Willman with Studebaker—G. L. Willman has taken an advertising position with the Studebaker Corporation, Detroit, Mich.

Leisaw Sales Manager—The Abbott Motor Car Company, Detroit, Mich., has appointed W. J. Leisaw as district sales manager for the states of Indiana, Michigan and Ohio.

Tire Salesrooms Opened—The new salesrooms of the Southern Tire Repair Company, Baltimore, Md., on Mount Royal avenue, near Maryland avenue, were opened recently.

Baltimore's Municipal Garage—An appropriation of $4,500 for the establishment of a municipal garage for Baltimore, Md., is included in the building inspector's account by the board of estimates.

Occupy New Salesrooms—The Baltimore, Md., branches of the Goodrich and Diamond tire companies, which consolidated recently, are now occupying the new salesrooms on Mount Royal avenue, near Maryland.

Boston Buys Buicks—The Boston, Mass., branch of the Buick Company sold last week to the fire department, wire department and the board of health three of the new model 30 roadsters for municipal work.

Cain, Chief Engineer—James W. Cain has been appointed chief engineer of the McCord Manufacturing Company, Detroit, Mich., with direct jurisdiction over the engineering, testing and experimental departments.

Columbus Has Eleven—The last of the motor-driven fire apparatus was received by the Columbus, O., Fire Department from the Seagrave Company recently and there are now four fire companies equipped with the apparatus.

Marion Gets Fire Auto—Marion, Mass., now has a motor combination chemical and hose wagon which was installed recently. It was presented to the town by Colonel Harry Converse, of Boston, Mass., a summer resident.

Beehler Company Odds—The Beehler & Ogden Motor Company, Baltimore, Md., has taken in the two-story building in the rear of its building at Lexington and Carrollton avenues to equip it for an up-to-date repair shop.

Powers Philadelphia Manager—F. W. Powers, manager of the Goodyear Tire & Rubber Company's branch, Washington, D. C., has been promoted to the managership of the Philadelphia, Pa., branch. His successor has not yet been appointed.

Greenburg Sales Representative—Alfred A. Greenburg, secretary of the Detroit, Mich., section of the Society of Automobile Engineers has undertaken the sales representation in that city of the products of the Baltimore Tube Company.

Murphy Succeeds Troutman—Ralph Murphy, formerly head of the inspection division of the H. H. Franklin Manufacturing Company, Syracuse, N. Y., has taken the managership of the service department, succeeding J. F. Troutman, resigned.

Martin, Traveling Representative—J. J. Martin has become a traveling representative of the Commerce Motor Truck Company, Detroit, Mich., which concern is working out a new line of machines to be brought out around the first of the year.

Detroit Firm Busy Again—The Detroit, Mich., Seamless Steel Tubes Company is again in position to accept orders for its products for shipment after January 1, it having been practically out of business since July 1, owing to a disastrous fire.

Metz Branching Out—Because of the demand for its cars in other sections the Metz Company, Waltham, Mass., has decided to open a branch in New York City that will be used as a station for distributing the cars to the middle Atlantic and western states.

More Oil Branches—E. A. Buck & Company, Worcester, Mass., one of the independent companies, has added two new stations to their chain in Massachusetts by opening branches at Greenfield and Medford, covering both the eastern and western parts of the Bay State.

Bus Service in Huntington—Motor bus service will be established in Huntington, Ind., by the newly organized Huntington Auto Transit Company. The city has ten thousand inhabitants, but has never had street car service, and there are no prospects of any in the near future.

Olean Wants Truck—The Adams Brothers Company,

Automobile Incorporations

AUTOMOBILES AND PARTS

AKRON, O.—Motor Starting Company; capital, $25,000; to deal in automobiles and supplies and manufacture motors. Incorporators: R. A. Woods, M. Paul, E. W. Paul, A. M. Tschantz and C. L. Dinsmore.

ALTON, ILL.—Alton Automobile Company; capital, $10,000; to repair automobiles. Incorporators: H. F. Horstman, William Winter, L. F. Winter.

ASBURY PARK, N. J.—Croce Automobile Company; capital, $250,000; to deal in automobiles. Incorporators: L. P. Croce, H. A Watson, T. G. Appleby.

BEDFORD, O.—Bedford Supply Company; capital, $10,000; to deal in automobiles and supplies. Incorporators: F. B. Senter, F. H. Calvert, G. W. Show, N. C. Boyd, A. B. Condon.

BROOKLYN, N. Y.—American National Motor Bus Company; capital, $1,000,000; to purchase, lease and otherwise deal in motor buses, trucks, etc. Incorporators: C. A. Clarke, S. L. Conklin.

CINCINNATI, O.—Northway Motor Company; capital, $600,000; to manufacture automobiles and engines. Incorporators: R. E. Northway, Wm. Pabodie, W. D. Friste, E. E. Decebach, F. B. Enslow.

DETROIT, MICH.—Superior Motor Company; capital, $100,000; to manufacture a two-cycle motor. Incorporators: Henry Fraser, G. C. Brimmer and W. C. Schneider.

INDIANAPOLIS, IND.—Huntington Automobile Transit Company; capital, $25,000; to engage in automobile service. Incorporators: J. M. Hicks, S. A. Stemen, J. W. Caswell, W. W. Hawley, O. E. Bradley.

KANSAS CITY, MO.—England Brothers Motor Car Company; capital $2,000; to manufacture automobiles. Incorporators: Edward England, E. W. England.

MANSFIELD, O.—Brucker Motor Car Company; capital, $5,000; to deal in automobiles and accessories. Incorporators: David D. Brucker, Wm. F. Voegle, Jr., Lewis Bruckert, Arthur E. Courtney and J. M. Ottinger.

MUSKOGEE, OKLA.—Pioneer Motor Company; capital, $5,000; to manufacture automobiles. Incorporator: G. S. Waddell.

NEW YORK CITY.—Rector Engine Corporation; capital, $150,000; to manufacture machinery. Incorporators: E. Gore, W. Magowan, S. C. Yeaton.

NEW YORK CITY.—Rolaff Oil Carburetor Company, Inc.; capital, $25,000; to manufacture and sell carburetors. Incorporators: R. Wolfsky, J. W. Stone, Wm. G. Van Vleck.

NEW YORK CITY.—The Kells Motor Radiator Corporation; capital, $650,000; to manufacture and deal in automobile radiators. Incorporator: H. R. Bingham.

NEW YORK CITY.—F. W. Ofeldt & Sons, Inc.; capital, $20,000; to deal in motor trucks, power wagons, etc. Incorporators: E. Y. Eltonhead, E. G. Ofeldt and Frank A. Ofeldt.

NEW YORK CITY.—Motor Trading Co., Inc.; capital, $10,000; automobile business. Incorporators: W. A. Shepard, Robt. W. Tindall and Albert Donces.

GARAGES AND ACCESSORIES

CHICAGO, ILL.—Illinois Tire Filler Company; capital, $10,000; to deal

Findlay, O., entertained one day recently a committee from the Olean, N. Y., fire department, headed by the fire chief, S. T. Rogers. The committee was looking over the Adams plant with a view of purchasing an automobile fire truck.

Kingsley's Racer Burned—The big 70-horsepower, six-cylinder Thomas car with which John J. Kingsley won the amateur championship of New England at races at Readville, Mass.; Rockingham Park, Salem, Mass., and elsewhere, was destroyed by fire recently at his summer home at Franklin, Mass.

Connell with Commerce—H. L. Connell, member of the recently established motor testing division of the Society of Automobile Engineers, Detroit, Mich., is engaged in engineering work for the Commerce Motor Car Company, of that city, which intends to bring out a line of motor trucks about the first of the year.

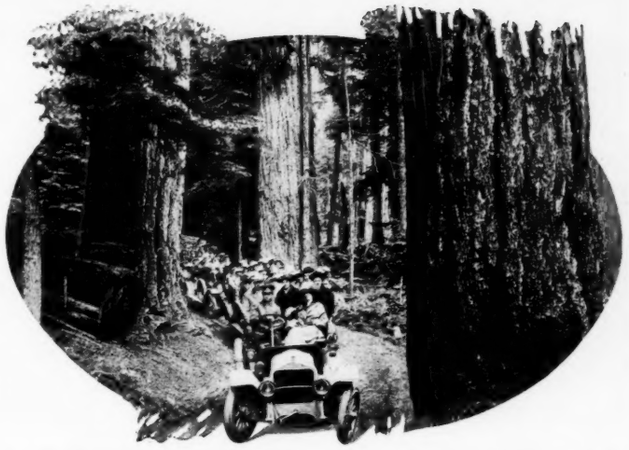
Nankivel, Foreign Distributor—Claude M. Nankivel, 17 State street, New York City, has been appointed foreign distributor for Stewart delivery trucks, manufactured by the Stewart Motor Corporation, Buffalo, N. Y. Mr. Nankivel will handle the sale of these trucks in Europe, Australia, New Zealand, South Africa and South America.

Reiman Sues Service Truck—Charles S. Reiman, of Chicago, Ill., has brought suit in the circuit court at Wabash, Ind., against forty-nine stockholders of the Service Motor Truck Company. He asks $50,000 damages because he was restrained from selling $20,000 worth of stock in the plant. The restraining order has since been dissolved.

Discharges 400 in Day—Every one of the 400 employees of the Catle Lamp Company, Battle Creek, Mich., makers of automobile lamps, from superintendent down to the boy, has been discharged from an order from the board of directors. On the following Monday the plant will re-open, hiring an entirely new force and affecting a thorough organization.

Physicians Win Their Case—The Boston physicians who protested to the Boston Street Commission against the ordinance that prevented them leaving their cars outside their residences or the places where they were on a professional visit have won their case, for recently the commission amended the ordinance excepting doctors from its provisions as well as clergymen.

League Conference—The Lowell, Mass., Automobile League had a conference recently with Commissioner Brown, of the Street Department, and City Engineer Kearner relative to the bad conditions of the streets and the Merrimac Valley boulevard. Specific instances were brought to the attention of the officials and they gave orders to have repairs made at once.



In the heavily-wooded section of Mount Rainier National Park. Automobile buses conveying sight-seeing tourists

Party of tourists at the height of the season starting on a tour of Mount Rainier Park by motor bus

Baltimore Owners Fight Tax—Dealers and owners of automobiles in Baltimore, Md., are aroused over the municipal plan to introduce an ordinance for taxing cars from $5 to $50 in addition to the present three taxes now being paid by the owners—namely, $20 for owners' license, $2 for operator's license and a personal tax to the city and state. The Automobile Club of Maryland and all the dealers and owners will fight this unjust tax, if passed, by carrying the fight to the highest courts.

Indiana Clubs Joined—There is a movement on foot to organize all of the automobile clubs in Indiana into a state organization. A meeting will be held in the rooms of the Hoosier Motor Club in Indianapolis, Ind., on December 14, at which time a ways and means committee will be appointed to secure the formation of the state organization. An effort will be made to bring the clubs of Logansport, Indiana Harbor, Jeffersonville, South Bend, Fort Wayne, Kokomo, Salem, Muncie, Madison, Terre Haute and Winchester into the organization.

U. S. Rubber Adds—The United States Tire Company, operating four plants, is planning an expenditure of over $3,000,000 in factory improvements and extensions. First of all, the Morgan & Wright plant, which is located in Detroit, Mich., is to be doubled in both area and production. Six thousand workmen will be required when all improvements are finished. The output of the factory will be in excess of 5,000 tires daily. It is the intention of this company to also increase the facilities of the three remaining plants in Indianapolis, Ind., Hartford, Conn., and Providence, R. I.

in vehicle wheels, tires, rims, etc. Incorporators: Albert Jacobs, Anton Percival, C. B. Stafford.

CINCINNATI, O.—The Citizens' Auto Service Company; capital, $7,000; to engage in automobile service. Incorporators: W. H. Davis, F. W. Kelly, L. J. Hoppe, A. Putman, J. L. Kohl.

CLEVELAND, O.—Dayton Airless Tire Sales Company; capital, $10,000; to deal in automobile tires and supplies. Incorporators: Wm. A. Carey, H. Krejoi, F. W. Chandler, R. M. Edwards and M. Otter.

CLEVELAND, O.—Dayton Airless Tire Sales Company; capital, $10,000; to deal in automobile tires, supplies, etc. Incorporators: W. A. Carey, B. Krejel, F. M. Chandler, R. W. Edward, M. Otter.

COLUMBUS, O.—Bracken Stauton Tire Company; capital, $5,000; to manufacture automobile tires. Incorporators: W. F. Bracken, M. B. Stauton, L. A. Stauton, May Bracken, T. E. Curtin.

GLEN COVE, N. Y.—Glen Cove Garage, Inc.; capital, $1,000. Incorporators: T. F. Meade, Edward Lewis and Lillian Lewis.

HAGERSTOWN, MD.—Hagerstown Automobile Club; to promote good fellowship, the use of automobiles, secure improvements to the roads and highways, assist in the enforcement of laws relating to motor vehicles and to secure legislation, and protect the interests of automobile owners. Incorporators: Albert Heard, S. H. Weihenmayer, Dr. Victor D. Miller, Jr., J. E. Stonebraker, Geo. A. Zook, E. W. Byrson, Wm. B. Littleton, Dr. J. McP. Scott, Dr. Royer Laughlin, Dr. W. Preston Miller, John A. Beck and Chas. M. Danzer.

INDIANAPOLIS, IND.—Ham-Meix Company; capital, $150,000; to manufacture acetylene self-starters and generators.

INDIANAPOLIS, IND.—Auto Lamp & Number Company; capital, $3,000; to manufacture a combination illuminated registration number and tail light. Incorporators: R. Griffin, A. P. Conklin, R. H. Bruce, W. F. Johnson and Geo. L. Maas.

LYNN, MASS.—Suffolk Street Garage; capital, $5,000; to repair automobiles. Incorporators: Daniel Lynch, John Buckley, Henry Thomas.

NEW YORK CITY.—Queensboro Garage, Inc.; capital, $10,000. Incorporators: F. A. Jockers, Augusta Jockers, D. J. Stack and Angelica M. Stack.

NEW YORK CITY.—Motor Dealers' Contest Association of New York, Inc.; capital, $30,000. Incorporators: Inglis M. Uppercu, Emanuel Lascaris and James C. Nichols.

NEW YORK CITY.—United Rubberine Supply Company, Inc.; capital, $200,000; to deal in tire fillings, rubberine, etc. Incorporators: Herman Mayer, T. H. Royce, C. L. Bookheim.

PHILADELPHIA, PA.—Auto Safety Signal Lamp Company; capital, $100,000; to manufacture lamps and lighting devices of all kinds. Incorporators: L. Ables, Jesse Drew, J. G. Gray.

ROCHESTER, N. Y.—Rochester Macandaruba Tire Filler Company; capital, $10,000; to deal in tires, tire fillers, etc. Incorporators: Chas. S. Morris, John S. Crosier and Albert C. Olp.

CHANGES OF CAPITAL AND NAME

DETROIT, MICH.—Change of name from Republic Motors of Michigan to Republic Motor Car Co. of Michigan.

GALION, O.—Cleveland-Galion Motor Truck Company; capital increased from $300,000 to $1,000,000.

RICHMOND, VA.—Westcott Motor Car Company; capital increased $100,000.

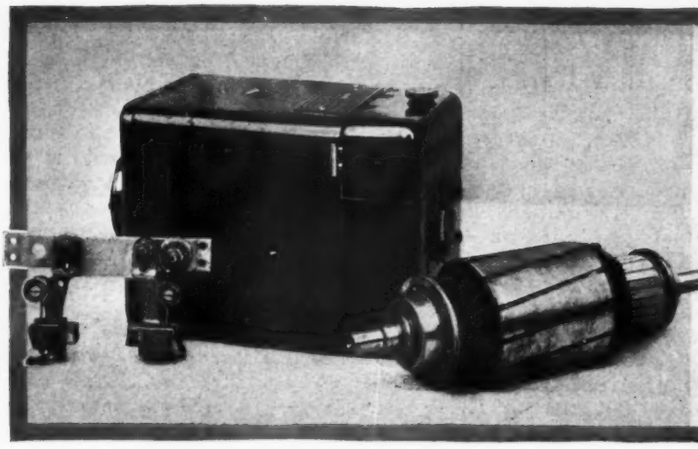


Fig. 1—Ward Leonard charging and lighting dynamo dismantled.

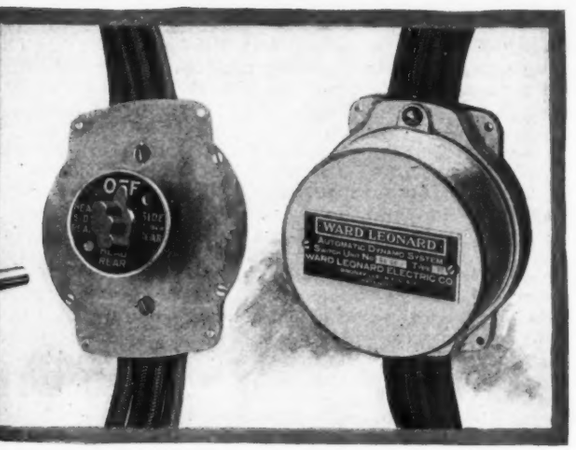


Fig. 2—Combined switch and distribution box

Ward Leonard Electric Lighting System

Automatically Keeps Battery Charged and Lights Supplied—Has Only One Hand-Operated Switch—Ingenious Design of Magnetic Controller

EVER since it was realized that electric lighting for the automobile possessed innumerable advantages over all other methods of illumination, inventors have directed their efforts toward the design of an electrical system that would have the merits of extreme simplicity as well as certainty of action, so as not to require that the driver be a trained electrician in order to keep his lighting in working condition. The necessary components of such a system are a dynamo that will furnish current while the car is in motion and a battery arranged to receive its charge from the dynamo so as to provide current for the lamps when the car slows down or stops. It is further necessary for successful operation that the dynamo supply a constant current while charging and lighting, and it is here that the real difficulty of the problem lies. Owing to the varying speeds and stoppages which are associated with the automobile some kind of control is essential in the relation of the dynamo to the system; otherwise a varying current that would be dangerous would result. Numerous and various solutions have been offered, only a small proportion of which can be said to be satisfactory from all points of view. These can be divided roughly into two classes: first, those in which the required constancy of current is obtained by a mechanical control of the dynamo speed to render it independent of the speed of the car; and second, those in which the same result is attained by electrical control of the generating power of the dynamo, even though its speed varies with the car. In the former case, resort was generally made to the slipping clutch with centrifugal governor; while in the latter some method of field adjustment, either through brush position or rheostatic resistance was tried.

The Ward Leonard automatic dynamo lighting system is a successful system belonging to the second of the two classes mentioned. Its most notable feature is its extreme simplicity. It consists, so far as the owner need know, of a single switch fixed on the dash or under the driving seat, which is to be turned on when light is wanted and turned off when it is not wanted. All the operations of charging, connecting and disconnecting dynamo and battery are automatic. The switch is shown in Fig. 2, the central circular portion with the thumb lever in the left hand view being the only part visible on the dash.

Actually, the system, as supplied from the factory, comprises a shunt dynamo to be driven from the engine by silent chain or gear; an automatic electrical controller which switches on the dynamo when its speed is high enough to generate the necessary amount of current for charging and lighting, disconnecting at lower speeds; and the rotary snap lighting switch mentioned above, together with armored cable correctly wired up and provided with plugs ready for insertion into the lamp sockets.

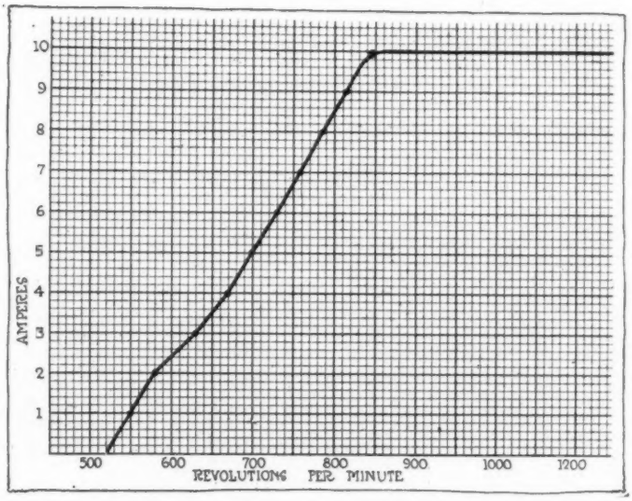


Fig. 3—Current output curve of dynamo in relation to speed

Fig. 1 shows the dynamo with the armature and brushholder removed. It will be seen that the magnet casing is of totally enclosed rectangular box form, allowing the maximum of power for a given space. It is a two-pole shunt wound machine weighing 24 pounds and supplying 10 amperes at 800 revolutions per minute. The armature is skew slotted and is run on Hess-Bright ball bearings of ample size. The commutator is large and is built up of many segments giving good wearing qualities with the least amount of sparking at the brushes. Carbon brushes, spring controlled, bear on each side of the commutator. They are fitted to a single brush holder, shown at the left of Fig. 1, which is fixed by four screws to the magnet casing. The current output of the machine, in relation to revolutions per minute is shown in the curve, Fig. 3, which has been plotted from actual tests. It will be seen that a current of 10 amperes

is supplied when the speed reaches 800. At this speed the automatic controller is in action, preventing a larger output irrespective of any increase of the dynamo speed.

The automatic controller, shown with the cover removed in Fig. 4, consists of two magnetically operated switches and a small resistance unit, all three contained in a box 4 3-4 inches long. V is a coil of fine wire surrounding an iron core, which when sufficiently magnetized by the current flowing in the coil, attracts the iron arm V1 against the pull of the light spring V2 and closes the two contact points at V3. These are so wired as to permit the main current from the dynamo then to pass to the battery and lights. S is a coil of heavy wire wound on a similar core, which when magnetized with the main current allowed to flow by the action of the voltage switch as described above, attracts the arm S1 against the pull of the spring S2 and opens the contact points S3. This action puts the resistance coil R in circuit with the field magnet coils of the dynamo, weakening the latter to such an extent that the output in amperes is below that necessary to hold the arm S1, which is therefore released, cutting out the resistance again. It will be seen how this action repeats itself so long as the dynamo speed is kept up. In actual practice the switch arm S1 is vibrating at such a high rate as to have no effect whatever on the lights. In consequence of this rapid vibration the platinum contact S3 on the switch arm is not attached direct thereto but is fitted to a flat spring mounted on the arm. This construction is common electric practice, and its purpose is to give a slightly rubbing contact between the two platinum surfaces, thus keeping them perfectly clean. The switch arms swing on an extremely short phosphor bronze strip firmly riveted to the core casing. This does away with the danger of the wear which accompanies a pivoted hinge. In addition to the two coils V and S, a third auxiliary series coil is wound on the same core as V, the chief purpose of which is to insure the perfect demagnetizaton of the core should a reversal of current take place.

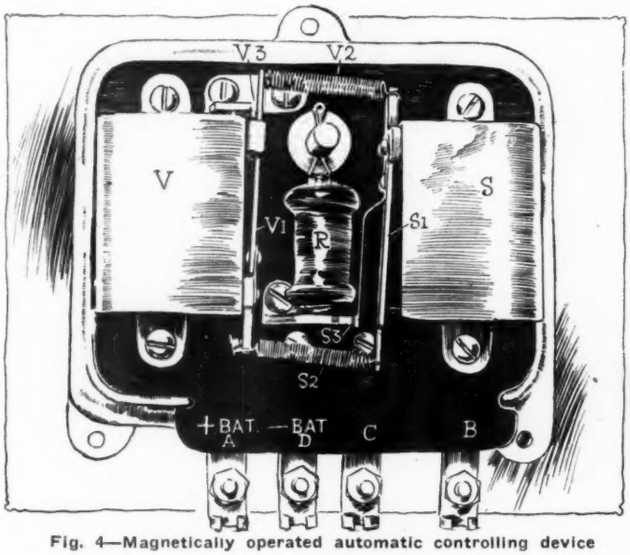


Fig. 4—Magnetically operated automatic controlling device

In Fig. 2 are given back and front views of the combined lighting switch and distribution panel. The latter is screwed to the back of the dash or inside the front seat panel and from it issue the brass-armored twin cables to the lamps, dynamo and battery. All inside connections are permanently soldered, so that there is no possibility of loosening through vibration. The switch itself is of the widely used rotary snap type, having four positions as follows: 1, side and rear lights; 2, headlamps and rear; 3, head, side and rear, and 4, off position.

Throughout the entire manufacture absolute interchangeability of all parts is secured by the use of well designed dies and drilling jigs and each set when complete undergoes a thorough test with lamps and battery arranged exactly as required on the car. All cables are cut to the proper length for the particular car to be fitted before leaving the factory, and provided with specially made plugs. The method of operation of the system as a whole can be seen by referring to the outline diagram of connections Fig. 5. Assume the dynamo to be turning, current will proceed to flow from the brush B1 along to the right as indicated by the heavy lines, through the coil of the series switch and thence to the arm of the voltage switch. At this point the main current suffers an interruption through the gap between the contacts V3. A small quantity of current, however, can pass through the shunted coil of the voltage switch, shown in fine lines, and return by the lower heavy lead to the dynamo brush B2; and when the speed of the car, and consequently of the dynamo, increases so as to bring up the voltage to a certain pre-determined amount necessary for charging the battery, the current so flowing is sufficient to pull over the switch arm of the voltage switch, thus connecting the main current to the battery and lighting circuit. The dynamo can now supply its full output of 10 amperes, running at 800 revolutions per minute, which corresponds to a car speed of roughly 14 miles per hour. Assume, now, that the speed of the car is increased so that there is a tendency on the part of the dynamo to generate more than the necessary 10 amperes. The increased amount passing around the coil of the series switch attracts the arm, opening the contacts S3 and thereby making it necessary for the shunted current of the dynamo field coil, shown at the left, to pass first through the resistance unit, which previously had been short-circuited. This weakens the field and consequently the output of the dynamo, and the switch arm flies back. As described above, there follows a constant vibration of the switch arm, alternately inserting and cutting out the resistance unit at an extremely rapid rate, resulting in an absolutely constant supply of current.

When the car is standing still or running slower than 7 miles per hour the dynamo is entirely disconnected from the battery by the gap V3 and the battery is automatically connected.

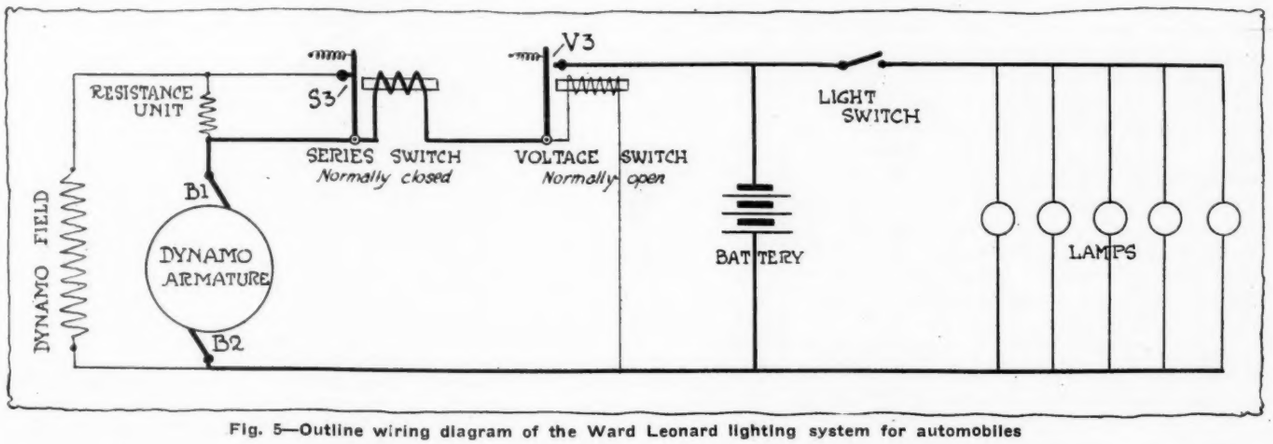


Fig. 5—Outline wiring diagram of the Ward Leonard lighting system for automobiles

Roberts Sectional Cell Tube; Comfortable Automobile Spectacles; New Spring Bumper; Nickel-Plating Compound; Winter Side Curtains; Standard Vulcanizing Bag; Splitdorf Coil-Switch

Roberts Sectional Pneumatic Tire

AN IDEA original in its specific field, although tried with success in other departments of engineering, is used in the Roberts sectional tube, Figs. 1 and 2. This tire is designed to take the place of the pneumatic inner tube and is practically punctureproof, inasmuch as, even if the rubber is punctured in any one place, the tire does not give out as in case of a conventional inner tube. The Roberts substitute for the tube consists of ten sections which when placed in the tire casing fill it completely, exactly like an inner tube. Each tube in turn is formed of thirty hexagonal cells, each of which is individually closed at both ends. The air in each cell is under the pressure corresponding to the size of the casing in which the tube is used. In the making of the tube each section, with the cells closed at one end, is placed in a special machine, where the cells are filled with the proper amount of air to obtain the right pressure, being vulcanized after the sufficient quantity of air has been introduced in every cell. As each casing is thus filled with 300 independent inner tubes in each of which the proper inflation pressure exists, it stands to reason that even if, say, seven cells of a section are punctured, the remaining twenty-three will keep it in good working shape. If a section has so suffered that it gives no more good service it may be replaced by a new section. It is intended by the Roberts Rubber Manufacturing Company, New York City, to guarantee the tube for a great number of miles and to soon take up its manufacture in large quantities.

Willson's Albex Folding Goggles

T. A. Willson & Company, Reading, Pa., are the manufacturers of the goggles, Fig. 2, which are made of soft material excepting the lenses. The sides of the goggles are made of soft leather and formed with a number of holes each, so as to permit of some ventilation for the eyes and to prevent sweating of the lenses. The latter are held in silver-plated rings and are furnished in amber, smoke tint, white and Fieuzal, according to the wish of the purchaser. A soft strip of material forms the bridge which rests on the nose and flexible cable temples permit of holding the goggles in place with great ease. The appearance of these goggles is very distinguished and decidedly sportsmanlike. The goggles are furnished in a handy leather case finished in seal grain, which is small enough to go into a pocket and which in itself adds materially to the appearance of the outfit.

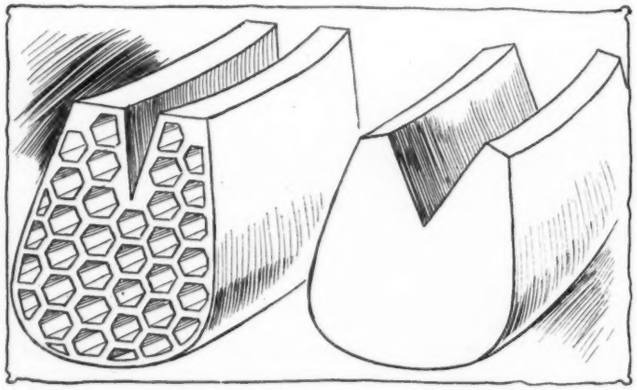


Fig. 1—Roberts sectional, cellular inner tube

New Randerson Steel Bumper

The new bumper of the Randerson Auto Parts Company, 110 West Thirty-fourth street, New York City, is distinguished by being made of steel throughout. The construction features, which have not been altered, are seen in Fig. 6, while the appearance of the double type of bumper is shown in Fig. 7. The principal new point is the use of steel for the connecting arms C, in which the bumper bar is supported and which are secured to the side members of the chassis. These bars are fashioned with a clamp at one end, into which fits the bumper bar, while the other end fits into a cylinder containing the shock-absorbing elements of the bumper. These consist of a piston P slidable in the cylinder C1 and a large spring S which is compressed between the piston P and the end E of the cylinder, when the bumper

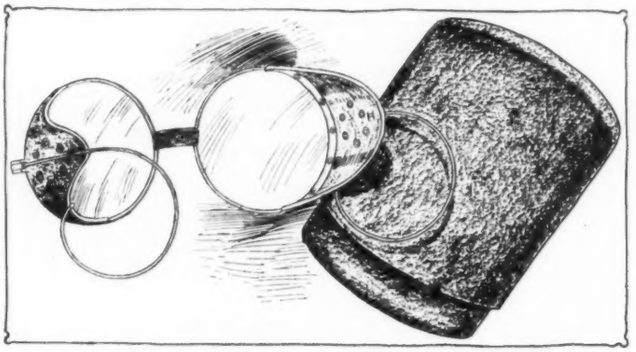


Fig. 2—Willson's Albex comfortable spectacles

car strikes an object. The small spring S1 coiled inside of S serves another purpose; one of its ends is secured to E and the other to the head Q of the piston P, tending to pull the latter as far as possible toward E. The joint J connects the head Q and the connecting bar C, permitting of a swivel motion of the latter when it is pulled out of the end E1 of the cylinder C1. By this expedient the bar connection C may be turned up or down, to clear the starting crank. Fig. 7 shows another type of bumper in which two bars are used. The Randerson company makes a variety of types, some of which include the up-and-down feature and which differ principally by the kinds of bumper bars used. Round and square tubes as well as I-beam forgings may be obtained for the bars.

Zeuss Royal Nickel-Plating Salt

R. F. Lang, 31 Broadway, New York City, is the importer of a nickel-plating salt specially adapted for plating metal ware used on automobiles, which is exposed to the inclemency of the weather. The salt furnished for this purpose is emerald green and crystalline in structure. To prepare the electroplating bath, 1 part by weight is dissolved in about 4 parts of water, the best proportion being 25 gallons of water to 55 pounds of the plating salt. The dissolving should be done in lukewarm water and the bath be slightly acid; which means that it should redden blue litmus paper slightly. If the litmus is reddened intensely the bath contains too much acid and should be weakened by adding caustic soda until the paper shows a faint red. A current from .6 to 1 ampere at 2.5 or 3.5 volts should be used for electroplating, the exact voltage depending on the number of pieces treated simultaneously in the bath and on the distance of cathode and anode. The exact voltage is, therefore, a matter which only experiment can teach. The temperature of the bath should not fall below 65 degrees Fahrenheit.

Studebaker 20 Side Curtains

The Studebaker Corporation, Detroit, Mich., has just developed a new side-curtain scheme for its Twenties, a type of car favored by doctors, etc. These side curtains are so constructed and mounted that they swing with the doors, their front edge being attached to the windshield frame, while the lower edges are secured to the door. A flap arranged to fall in line with the top edge makes a tight close there, while the back edge is fastened to the top by means of spring clips. In this way the curtains become units with their doors and may be opened and closed from inside the car, thereby saving the owner a great deal of uneasiness, which is ordinarily encountered in attaching the side curtains in Winter. By this arrangement the Studebaker 20 is transformed into a real Winter automobile, giving the passenger all the comfort of a larger car.

Splitdorf Coil Switch TS

The Splitdorf Electrical Company, New York City, has brought out a new type of coil switch which serves for both controlling and stepping up the ignition current generated in the Splitdorf low-tension magneto. As the schematic view, Fig. 4, shows, the coil switch is designed to be fitted to the dashboard, with the nickel-plated face protruding through the same and being in reach of the driver. The instrument consists, as its name implies, of a step-up coil and condenser working in combination with a switch. The latter is composed of two pieces of metal insulated from one another, which make contact between the several terminals to which the current flows after entering the device. The battery current enters through B1 and B2, flowing thence to B3 and B4, respectively. The magneto current flows through the contacts N, N1, M1, C3 and D. The contacts C3 and M1 are fitted with extension contacts, as shown by dotted lines in Fig. 4. The operation of the coil, with battery and magneto current used, is as follows:

When the switch is the magneto position, the two connector pieces on the switch face connect N1 with M1 and the extension of M1 with C3. The current produced in the magneto enters at N, passes to N1, M1 and C3, whence it flows—to the right in Fig. 4—through the primary winding of the coil shows as a heavy zigzag line and to D which is grounded. As the current passes through the primary winding, it induces a high-tension impulse in the secondary winding, which latter is connected to the grounded contact D and to G which is wired to the timer. When the battery system is used for ignition, the current enters through B1 and from B3 flows to the extension contact of M1, while B2 leads to B4 and through the switch contact to the extension of C3. From M1 it passes through the condenser C1 into the primary winding and thence back to C3, closing a complete primary circuit. The secondary circuit is excited in the same manner as in the case of the magneto current being used.

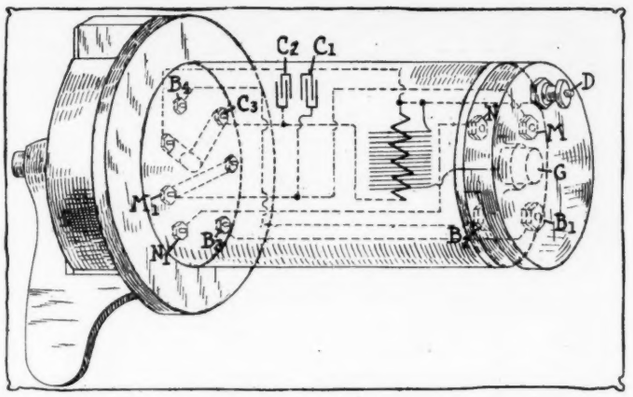


Fig. 4—Schematic view of TS Splitdorf coil switch

Thermite Anti-Freezing Solution

The Northwestern Chemical Company, Marietta, O., has begun to manufacture a compound which is added to the radiator water to prevent its freezing. This solution is called Thermite and in its pure state freezes at about 70 degrees below zero, while if mixed with an equal volume of water freezes at about 15 degrees, and if mixed with half its quantity of water, at 40 degrees below zero. The price of the compound is very reasonable, so that even a rich mixture of it may be used.

Standard Vulcanizing Air Bag

Operators of vulcanizing plants will find the Standard air bag, Fig. 3, a very useful accessory in their businesses. This bag is made of a canvas cylinder closed at each end by a metal head tapped for a screw-threaded plug. A plain plug is fitted into the hole of one plate, while the other one is equipped with a coupling to the end of which a piece of fabric-wound rubber hose is attached. This hose is fitted with a regular inflation valve, which permits of forcing compressed air into the bag, either by means of a tire pump or from an air compressor. The canvas is wound many times to form a wall practically impenetrable for the compressed air, and it is held tight against the end plates by two welded rings. The use of this bag is identical with that of any other vulcanizing bag; it is placed in the section of a tire casing which is to undergo heat treatment in the vulcanizing mold, so as to press the casing tightly against the mold. This bag is made by the Standard Tire & Rubber Company, Boston, Mass.

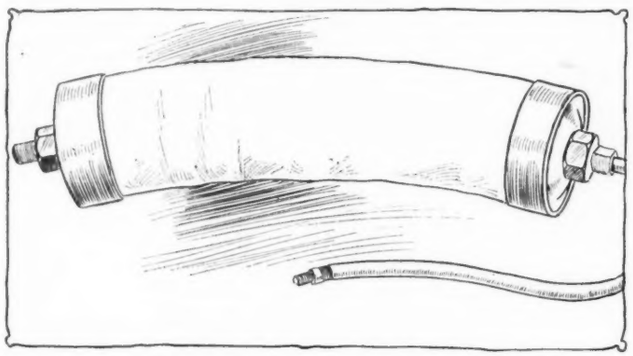


Fig. 3—Standard air bag for casing vulcanization

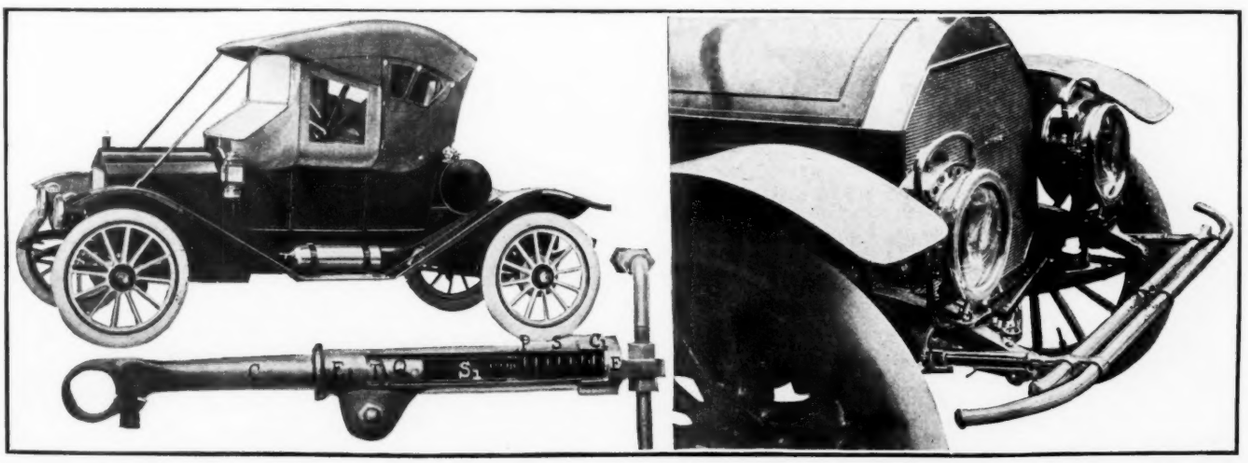


Fig. 5—Studebaker close winter side curtains. Fig. 6—Interior view of Randerson bumper mechanism. Fig. 7—Randerson double-rail bumper on car

Patents Gone to Issue

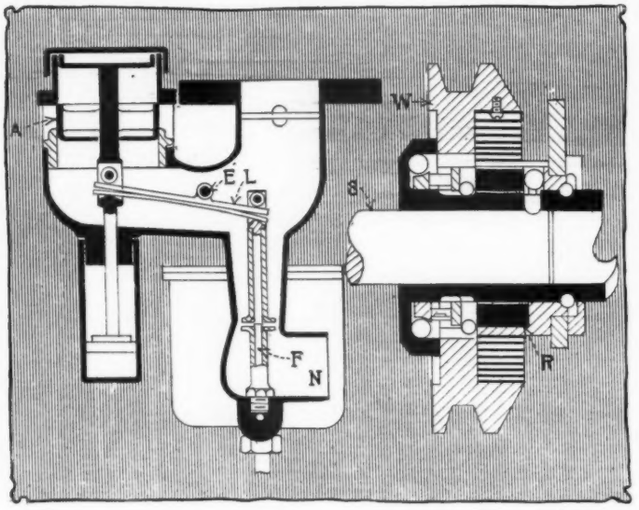


Fig. 1—Schulz positive carbureter. Fig. 2—Sharpe starter

CARBURETER Construction—In which air and fuel admission are both regulated by valves actuated by common lever means.

The subject matter of this patent, a carbureter, is shown in Fig. 1. It is of the float-feed type and fitted with a nozzle of variable orifice. The latter is regulated by means of the fuel valve F, the upper end of which is pinned to the lever L which is fulcrumed at E. The other end of the lever L is connected to the air inlet valve A which is of the sleeve type and serves as auxiliary supply, while the normal supply at low speeds enters through N, blowing past the fuel nozzle, where it vaporizes the gasoline. In connection with this construction, means are provided for moving the lever in two directions and holding it in any adjusted position.

No. 1,046,111—to Carl F. Schulz, Brooklyn, N. Y. Granted December 3, 1912; filed August 21, 1911.

Engine Safety Starting Device—Comprising a constructional detail for engaging the crankshaft when starting and for disengaging it after the engine has begun to work.

This patent has reference to a ratchet construction useful in engine-starter constructions, the subject matter being illustrated in Fig. 2. The crankshaft is seen at S and a wheel W is mounted on it, but not keyed to it. Between the shaft and the wheel a ring R is interposed which serves as a bearing for the wheel. Both the wheel and the shaft are formed with ratchet recesses in which balls are located, and the ring has openings registering at their opposite extremities with these recesses; the effect thereof being that when the wheel is turned in one direction it actuates the shaft, or if the shaft is turned in the opposite direction it actuates the wheel. Means are provided by which the ring is shifted longitudinally along the shaft, if the crankshaft rotates contrary to its operating direction, whereby the balls are disengaged from the ratchet recesses of the engine shaft, permitting the latter to move without producing a reversed torque in the starter mechanism.

No. 1,046,030—to William A. Sharpe, Denver, Col. Granted December 3, 1912; filed October 16, 1911.

Valve Spring Compressor—In which the members used for compressing the spring are adjustably connected.

Fig. 3 shows the device described in this patent consists of two spreader members, one of which M is pivoted to the end of a screw-shaped connector piece S and the other M1 is mounted on S, so that it may be worked along its thread by actuating a thumb-nut N. The opposite ends of M and M1 are shaped with forks which engage the valve springs; the forked end of M being larger than that of M1 and being formed with inwardly projecting lugs. A bail is pivoted at the end of M and adapted to be fastened over the end of M1.

No. 1,045,321—to Philip F. Pillines, Philadelphia, Pa. Granted November 26, 1912; filed July 20, 1912.

Tire Inflation Valve—Which is fitted with a closing device at its inner end to prevent leakage.

The tire valve described in this patent is shown in Fig. 4. This valve has a tubular portion T which extends within the tire tube and is positioned inside of an outer Tube T1 clamped upon the tire. A packing is in place between the two telescoping members T and T1. A valve through which the tire is inflated is contained in T; T is movable outwardly in T1 by air pressure inside of the tire. A head H formed on T1 forms a seat for the closing device C which is subject to the pressure obtaining in the pneumatic tube inside the tire, thereby keeping the inflation valve closed tightly.

No. 1,045,330—to Maximilian Charles Schweinert, West Hoboken, N. J. Granted November 26, 1912; filed February 10, 1909.

Automatic Lamp-Controlling Device—Consisting in a connection between the tie-rod and the lamp supports.

This patent refers to a lamp-controlling device in which the lamps are mounted on U-shaped forks, the single ends of which are fitted with one laterally extending arm each. These lateral extensions are made to engage the tie rod of the steering gear in such a manner that, if the tie rod is moved, the lamps are brought to turn in the same direction as the front wheels.

No. 1,046,010—to Oliver W. Page, Ione, Wash. Granted December 3, 1912; filed September 28, 1911.

Automobile Muffler—Being of the baffle plate type.

The muffler referred to in this patent comprises a casing, a series of inner baffles aligned along the axle of the casing and a series of outer baffles attached to the wall of the casing and spaced somewhat from the inner ones. Thus an unobstructed substantially straight passage is provided for the exhaust gases, as the baffles are mounted in staggered relation.

No. 1,045,936—to Eugene Bivert, Chicago, Ill. Granted December 3, 1912; filed January 22, 1912.

Pneumatic Tire Patch—A shield and guard flap protecting a repaired portion of an inner tube.

This patent has reference to a repair patch comprising a flexible strap encircling the tube, which is adjustable in length by means of members attached to its ends. Inside the strap is a member which spans the punctured portion of the tube; the ends of this member extend beyond the corresponding end of the strap.

No. 1,045,955—to Mark A. Dees, Pascagoula, Miss., assignor to American Tire Company, St. Louis, Mo. Granted December 3, 1912; filed January 3, 1911.

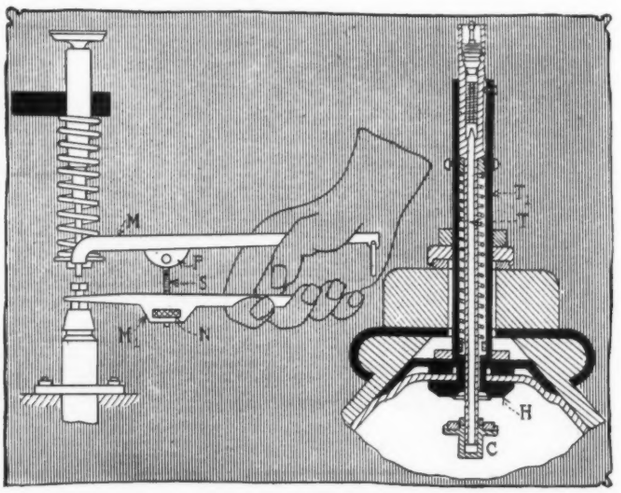


Fig. 3—Pillines spring compressor. Fig. 4—Schweinert valve